PROJECT MANUAL
FOR
ROOF REPAIR

UNITED STATES DEPARTMENT OF STATE
U. S. EMBASSY
GSO WAREHOUSE BUILDING
ATHENS, GREECE

PREPARED FOR
U.S. DEPARTMENT OF STATE
OVERSEAS BUILDINGS OPERATIONS (OBO)
PREPARED
BY
PRICE CONSULTING, INC.
211 HIGHLAND CROSS ROAD
SUITE 220
HOUSTON, TEXAS 77073
PCI PROJECT NO. 10670.10

PROJECT MANUAL
FOR
ROOF REPAIR

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SECTION 01010

SUMMARY OF WORK

PART ONE - GENERAL

1.01 SECTION INCLUDES:

Roof repair on the GSO Warehouse Building in Athens, Greece. Work includes, but is not limited to, the following:

a. Remove existing roof coating from concrete deck.
b. Fill-in and/or repair trenched areas in deck
c. Perform repairs to holes and cracks on inside face of parapet walls.
d. Build-up low areas of deck with concrete repair mortar.
e. Install loose-laid fleece-backed thermoplastic single-ply roof membrane.
f. Install prefabricated drain board.
g. Install cementitious faced insulation composite board panels.
h. Install new sheet metal flashings at penetrations, rise walls, and parapet walls.
i. Install new sheet metal scupper and drain inserts.

1.02 WEATHER PROTECTION:

A. Upon beginning work on the existing roof, Contractor shall perform repairs as necessary and as required to prevent leaks.
B. Contractor shall have at the work site, a sufficient amount of moisture proof coverings to provide quick temporary protection to exposed excavations and open sealant joints in the event of a rapid change in the weather.

1.02 CONTRACTOR'S USE OF PREMISES:

A. Confine operations at site to areas permitted by law, ordinances, permits and to limits of Contract as shown on Contract Documents.
B. Do not unreasonably encumber site with materials or equipment.
C. Do not load structure with weight that will endanger structure.
D. Assume full responsibility for protection and safekeeping of products stored on premises.
E. Move stored products which interfere with operations of U.S. Government.
F. Obtain and pay for use of additional storage or work areas needed for operations.
G. Coordinate use of premises under direction of Government's Representative.
H. Use of Site for Work and Storage:
   1. Restrict Work to areas indicated on Drawings.
   2. Store materials off site except for minor amounts of material which may be stored at designated staging area as approved by U.S. Government.
   3. Access site in areas approved by U.S. Government.
   4. Restrict parking to specific areas as approved by U.S. Government.
   5. Restrict debris removal to U.S. Government-approved area of building site.
   6. Restrict location of construction cranes to areas as approved by U.S. Government.
   7. Do not allow construction traffic on new roof membrane system except as absolutely necessary to perform new work. Provide 19mm (3/4-inch) plywood protection over existing roof membrane at traffic and work areas.

I. Maintenance of Access and Operations:
   1. Do not access roof without proper clearance from Post and Warehouse management.
   2. Do not perform operations that would interrupt or delay U.S. Government's daily operations.
   3. Maintain proper and safe access to existing building, facilities, parking, streets, and walkways; especially fire lanes.
   4. Schedule demolition and renovation operations with U.S. Government in such a manner as to allow operations to continue with minimum interruption.
   5. During period of construction, do not obstruct exit ways of occupied areas in any manner.

J. Maintenance of Existing Services:
   1. Do not disrupt existing utility services to existing building.
   2. Maintain environmental control in existing building, especially temperature, humidity, and dust control.
   3. Provide temporary lines and connections as required to maintain existing mechanical and electrical services in building.
   4. Notify U.S. Government a minimum of two days prior to each required interruption of mechanical or electrical services in building. These interruptions shall be only at such times and for lengths of time as approved by U.S. Government. In no event shall interruption occur without prior approval of U.S. Government.

K. Building Access:
   1. Access to roof construction areas shall be by way of exterior ladder or scaffold on the face of the building as designated by COR or by interior stairs if approved by Warehouse management.
   2. Contractor will not have access to building interior except as pre-arranged with COR.

1.04 OWNER OCCUPANCY:

A. U.S. Government will occupy premises during entire period of construction for the conduct of normal, daily operations. Cooperate with Government's Representative in all construction operations to minimize conflict and to facilitate U.S. Government usage.
B. Contractor shall conduct his operations so as to ensure least inconvenience to U.S. Government operations.
C. Contractor shall take precautions to avoid excessive noise or vibration that would disturb U.S. Government's operations. When directed by Government's Representative, Contractor shall perform certain operations at designated time of day or night in order to minimize disturbance to U.S. Government's operations.
D. Contractor shall take all necessary precautions to assure a watertight condition in the operation portion of the building during construction.
E. Refer to Section 01120 for provisions on security, special sequence of Work, maintenance of access and operations, maintenance of existing utilities and services, and building access restrictions.

1.05 OVERTIME WORK:

A. Contractor shall request approval from the COR for necessary overtime work on weekends and other times.

PART TWO - PRODUCTS

Not Used.

PART THREE - EXECUTION

Not Used.

END OF SECTION 01010

SECTION 01045

CUTTING AND PATCHING

PART ONE - GENERAL

1.01 SECTION INCLUDES:

A. This Section specifies administrative and procedural requirements for cutting and patching.

1.02 SUBMITTALS:

A. Cutting and Patching Proposal: Approval of procedures for cutting and patching is required before proceeding. Submit a proposal describing procedures well in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the proposal:

1. Describe extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.
2. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
3. List products to be used and firms or entities that will perform work.
4. Indicate dates when cutting and patching is to be performed.
5. List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
6. Where cutting and patching involves addition of reinforcement to structural elements, submit details and engineering calculations to show how reinforcement is integrated with the original structure.
7. Approval by Project Director to proceed with cutting and patching does not waive Project Director's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.

1.03 ALTERATIONS, CUTTING AND PROTECTION:

A. Responsibility and Assignment of Trades:
   1. Contractor may assign the work of moving, removal, cutting, patching, and repair to trades under his supervision so as to cause the least damage to each type of work encountered and so as to return the building as much as possible to the appearance of new work.
   2. Patching of finish material shall be assigned to mechanics skilled in the work of the finish trade involved.

B. Protection:
   1. Protect remaining finishes, equipment, and adjacent work from damage caused by cutting, moving, removal and patching operations. Protect surfaces which will remain a part of the finished work.
   2. Cover existing walls and floors where necessary to prevent damage from construction operations.
   3. During demolition, cutting and construction, provide positive dust-control by wetting dusty debris and by completely sealing openings to Government/Owner-

occupied areas with temporary seals to prevent spread of dust and dirt to interior areas.
4. After materials are installed, properly protect Work until final acceptance.
5. Any damage resulting from construction operations shall be required by Contractor without cost to Government/Owner.
6. During non-working hours, provide continuous security at unsealed openings cut into existing exterior walls and roofs.

1.04 QUALITY ASSURANCE:

A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.
   1. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements:
      a. Bearing and retaining walls.
      b. Structural concrete.
      c. Structural steel and wrought iron structures.
      d. Structural decking.
      e. Miscellaneous structural metals.
      f. Equipment supports.
      g. Piping, ductwork, vessels and equipment.

B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.

C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Project Director's opinion, reduce building's aesthetic qualities or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

PART TWO - PRODUCTS

2.01 MATERIALS:

A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

PART THREE - EXECUTION

3.01 INSPECTION:

A. Before cutting existing surfaces examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.
   1. Before proceeding, meet at site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.02 PREPARATION:

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.

C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

3.03 ERECTION/INSTALLATION/APPLICATION:

A. General: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Review proposed procedures with entity retained to perform subsequent restoration; comply with restorer's recommendations.

1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes, chases, and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. To avoid marring existing finished surfaces, cut or drill from exposed or finished side into concealed surfaces.
3. Cut into through concrete and wood using a cutting machine such as a carborundum saw or diamond core drill.

3.04 CUTTING AND DRILLING EXTERIOR WALLS AND FLOORS:

A. Cut and drill existing construction to permit Work under this Contract. Include cutting holes and other openings for plumbing, mechanical, and electrical work.

B. Cut by hand when possible. Cut holes and slots neatly to size required, with minimum disturbance of adjacent work. Cut round holes in masonry using core drills. Cut square and rectangular holes and chases in masonry by line drilling and using pneumatic stone cutting chisels to remove material between drill holes.

C. Cut slots in plaster with dry cutting diamond or carborundum blade saws mounted in a track or against a template constructed to assure true straight lines in finished work. Cut slots by hand within a distance equal to half the diameter of the saw blade from finish materials which are not to be slotted or cut.

D. Do not operate air compressors inside building, except in association with specialized tools which are specifically permitted in Contract Documents. Do not use hammers.

E. Do not drill or cut structural supporting elements without specific approval in each case, unless the element is shown on structural drawings to be drilled or cut.

END OF SECTION 01045

SECTION 01075

DEFINITIONS

PART ONE - GENERAL

1.01 SECTION INCLUDES:

A. Definitions for construction terminology not otherwise defined in Contract Documents.
B. Definitions for special terminology used for this Project.

1.02 ABANDONED - (NO LONGER NECESSARY OR IN USE):

A. "Remove" items so noted, or later defined, as an all inclusive responsibility within this contract. Pay for all work in connection with removal of these items, including municipal, disposal, utility, and service charges. Dispose of all "Excess".

1.03 ADDITION - (TO ADD TO AND BE INCORPORATED) ALSO TO "ADD":

A. Work supplementary to that indicated to accomplish that which is required by the Contract Documents. To bring to a new condition; to extend, fasten, patch, and match to that which is existing.

1.04 DEFECTIVE - (NOT ACCEPTABLE):

A. Refer to Conditions of the Contract, that which does not conform to the Contract Documents. As it applies to "Salvage", in addition to the above, shall mean "unsuitable".

1.05 EXCESS - (NOT REQUIRED):

A. More quantity than required to conform to the Contract Documents and not desired by the Owner. Debris shall be considered "Excess" and not be used as fill or be buried on this site. Remove "Excess" from the site and legally dispose of. "Excess" "Suitable" "Salvage" shall be property of Contractor unless otherwise specified.

1.06 EXISTING - (PRESENTLY THERE):

A. Also may be noted "original". Present conditions and assumed locations, if known, as of the Date of Contract Documents.

1.07 NEW - (TO BE INCORPORATED) NOT EXISTING:

A. Refer to various specification sections for requirements of Work to be incorporated.

1.08 REINSTALL - (TO INCORPORATE AS WAS ONCE DONE):

A. "Remove" and "salvage" existing from its location, if it does exist. "Restore", "Renovate", or "Remodel" and "Reinstall: in its existing location. Reincorporate and "re-work" the original work to the extent required by the Contract Documents.
B. If the "Existing" item, so indicated, is missing, defective, or unsuitable as "Existing", then "Reconstruct" only that portion with "New" products and incorporate as was original. Syn. Replace.

1.09 RELOCATE - ("REINSTALL" IN A NEW LOCATION):

A. "Reinstall" in a new location as indicated on Drawings.

1.10 REMAIN - (TO LEAVE WHERE IT IS EXISTING):

A. The final location of an item in its "existing" position, however, this shall not mandate the fact that this item will not move during this contract, specifically in order to "Preserve" or "Rework".

1.11 REMOVE - (TO TAKE FROM EXISTING LOCATION):

A. Work required to extract a portion or whole by one or a combination of methods and moved to a new location.

1. "Abandoned": Remove items by dismantling, excavation, extraction, or demolition, if acceptable.
2. Salvage: Remove by disassembly. "Relocate".
3. Products: Where a specific portion of component of an assembly or whole is to be removed, take all precautions to prevent damage, defacement, and displacement to the "existing" to remain (i.e., mortar, bricks, and finishes).

1.12 RENOVATE - (TO REPAIR AND MAKE NEW):

A. The process required to bring an item to a present new standard of condition required by the Contract Documents (e.g., to "rework" "existing" "suitable" "salvage" "products" and perform "new" work and "additions" required). (Syn. rehabilitate, recondition, repair.)

1.13 REPLACE - (TO TAKE THE PLACE OF):

A. "Remove" "existing" unserviceable product and provide "new" product in place of unserviceable product.

1.14 REUSE - (TO USE AS ONCE WAS):

A. The use of "suitable" "salvage" for incorporation or re-incorporation in the Work. "Remove", "Relocate", and "Reinstall" as required for "Reuse".

1.15 SALVAGE - (TO BECOME ABANDONED):

A. "Remove", protect, "preserve" incomplete material condition as found "existing". Also to "Save". Determine suitability for incorporation in this Contract. Store at a location mutually agreed upon. Dispose of all "Excess".

1.16 UNKNOWN - (NOT SHOWN ON DRAWINGS):

A. Products beneath surfaces indicated by drawings and encountered during the Work. Immediately support, shore, and protect. Immediately notify the Consultant and authority having jurisdiction. Allow free access for inspection. "Preserve" in proper condition until the Consultant determines definition and interpretation of Work. Take such measures as required for protection, reinforcement, or adjustment.

PART TWO - PRODUCTS

Not Used.

PART THREE - EXECUTION

Not Used.

END OF SECTION 01075

SECTION 01105

CONSTRUCTION SECURITY

PART ONE - GENERAL

1.01 SUMMARY:

A. Drawings and Specifications for this project are SENSITIVE BUT UNCLASSIFIED (SBU).
   1. Limit dissemination of unclassified information on a need-to-know basis. Assume responsibility for unclassified information as received, including drawings, sketches, photographs/exposed negatives, written descriptions of work requirements, and similar information; return such information promptly to Contract Office Representative (COR) upon request.
   2. Do not allow removal/transmission of such information from Project Site without COR approval.

B. The work of this section involves interfaces with a number of security-related Government entities and includes, but is not limited to:
   1. Screenings/Clearances/Briefings/Debriefings for U.S. and Local Labor
   2. Access to Site and Work Area
   3. Procurement and Shipping Logistics
   4. Fabrication/Transit/Receiving/Storage/Installation/Protection of Materials
   5. Accommodating Surveillance and Inspection by Government

1.02 DEFINITIONS:

A. CONTROLLED ACCESS AREA (CAA) are areas within a building where classified information will be handled, stored, discussed or processed. For this project, the CAA is the structural roof deck, concrete walls, and the office space directly below the roof deck in the Consulate Office Building.

B. CLEARED U.S. CITIZEN possesses a current validated security clearance as required by the DD-254, the Contractor's facility clearance, and is authorized by OBO to be at the project site. Except as otherwise indicated, obtain security clearances for each person required, at a security level equal to highest classification of material/information/equipment to which that person has access and exposure.

C. SITE SECURITY MANAGER (SSM) is the Regional Security Officer (RSO) or a properly appointed designee responsible for this project.

D. CONSTRUCTION SECURITY PLAN (CSP) is a certification plan for the Project's security requirements prepared by OBO listing principal actions, clearance levels, materials classification and logistics similar to this specification section. This plan will be sent to the post for their use and information during the Project.

1.03 SUBMITTALS:

A. Security Clearances: Submit a Visitation Authorization Request (VAR) to include dates of the project, clearance level, date of birth, social security number and Letters of Consent (LOC) for each individual traveling to the project site.

B. Where clearances are required for subcontractors including U.S. and local laborers, manufacturer's representatives and others performing work in limited-access, submit information required for securing clearances well in advance of time such accesses will be needed, typically twenty–one days.

C. Vehicle Clearances: Submit authorization requests, to include dates, vehicle type, license number and driver name, for each motorized vehicular construction implement which is required to be on-site. Schedule vehicles to arrive during off hours when possible. Provide one day's advanced notice on vehicle arrivals times.

D. Shipping Plans: Provide written plan for shipment of materials to include the following information:
   1. Port(s) of embarkation, debarkation and shipment route.
   2. Estimated time of arrival and duration of intermediate stops.
   3. Company names and countries-of-registry for contemplated sea/air carrier(s), and freight forwarder(s).
   4. Bill of Materials (SECURE shipments only)

PART TWO - PRODUCTS

Not Used.

PART THREE - EXECUTION

3.01 U.S. CLEARED PERSONNEL:

A. Contractor personnel's minimum level of security clearance for this Project is SECRET.
B. Obtain security clearances for:
   1. Persons involved with performance of work.
   2. Persons exposed to or requiring access to confidential materials/information/ equipment.
C. Escort Training may be provided by the Department of State for the contractor's supervisory personnel who will be escorting uncleared personnel on-site. Upon award of contract, the Contractor shall request that the COR schedule the one day escort/x-ray training in Washington, DC prior to Mobilization.
D. Contractor's personnel at all levels may be required to attend counter-intelligence briefings and host country briefings, and may be required to attend debriefings when returning from host country.

3.02 LOCAL LABOR:

A. An Escort Ratio of the number of host country or third country national uncleared personnel to one U.S. cleared citizen will be determined by the RSO.
B. Local labor may not access the Consulate Office Building roof. Local labor may be used on the compound grounds provided that uncleared laborers are escorted by U.S. cleared citizens for the following types of work:
   1. Movement and placement of materials on the ground to the roof
   2. Removal of debris on the compound grounds.

3.03 ACCESS TO THE SITE:

A. Access to the roof :
   1. U.S. cleared citizens shall access the roof from either the INTERIOR or EXTERIOR of the building
   2. Uncleared personnel shall not access the roof.
   3. Material loading/off-loading shall be from the EXTERIOR of the building.
B. Contractor shall be responsible to escort their uncleared personnel, including vehicles, at all times while on the site. Limit personnel movement through the interior. SSM will determine access routes and allowable hours.
C. Identification Badges: The Government will issue identification badges, coded to indicate status and level of security clearance. Require cleared U.S. Citizens to retain their badges, and require uncleared persons to leave their badges upon leaving Project Site.

D. Search Procedures: Government reserves the right to conduct search of belongings both at point of entering Project Site and at point of leaving.

3.04 SHIPPING OF MATERIALS AND EQUIPMENT:

A. Materials for this Project are UNCLASSIFIED and shall be shipped NON-SECURE.
B. Comply with Government approved shipping plans.
C. Use surface and air carriers in the following order of preference:
   1. U.S. military (SECURE shipments only)
   2. U.S. flag carriers
   3. Foreign flag carriers of countries which are not on Designated countries list.
D. Government reserves the right, in its sole discretion, to determine whether products have been compromised, and therefore cannot be used in CAAs and adjacent areas. Where such compromise results from Contractor's failure to comply with security procedures, the Contractor shall bear entire cost associated with rectification of compromise and restoration of required security provisions.

3.05 PROTECTION OF MATERIALS:

A. Materials for this Project shall be procured by NON-SECURE or LOCAL means and stored NON-SECURE.
B. Maintain confidentiality in procurement of products by non-disclosure of destination information until items are fully procured and protected.
C. Approved Procurement Methods for this Project:
   1. Secure U.S. Procurement: Select quantity required from chosen supplier. Submit specific Bill of Materials for procurement of products/materials/equipment to be shipped SECURE to the site. For each product identify:
      a. Vendor and address
      b. Material type and quantity
      c. Country of origin, defined as location where end product is produced
      d. Country of purchase. List separately those items to be procured outside the U.S.
   2. Non-Secure U.S. Procurement: No restrictions on U.S. procured inspectable or non-inspectable products/materials/equipment shipped to the site.
   3. Local Random Procurement: Procure limited quantities of inspectable or non-inspectable products/materials/equipment randomly from local suppliers. Repeated procurements of same items or from same supplier shall be limited. Select quantity required from random chosen supply, and amounting to not more than 25 percent of supply available.
   4. Local Unrestricted Procurement: Procure raw materials locally and without security restrictions on handling and storage; these are subject to Government's reasonable inspection and requirement for random daily selections in use.
      a. Water, and other bulk-contained fluid/gas products.
      b. Temporary materials and services, including scaffolding and concrete formwork.
      c. The ingredients and premixing of poured-in-place concrete, excluding reinforcing steel.
      d. Sand, gravel, crushed stone, mortar, plaster, stucco, grout, and similar work.
D. Storage Procedures:
   1. Location and locked control of storage and staging area belongs exclusively to SSM.
   2. Place incoming products in staging area, and immediately inspect selected items for signs of tampering or alteration before placing in storage or other secure areas as designated by SSM

3.06 INSPECTIONS:

A. Government reserves the right to require suspension of work where introduction or attempted introduction of unauthorized materials into the work has been detected. At

Government's option and direction, Contractor is responsible for costs and time losses associated with rectification of work to correct such unauthorized actions.

B. The use of photographic equipment and taking of photographs is restricted on and nearby Project Site. Request permission from the RSO to carry equipment on-site and take photographs.

END OF SECTION 01105

SECTION 01120

ALTERATIONS PROJECT PROCEDURES

PART ONE - GENERAL

1.01 DESCRIPTION:

A. Summary: The procedures and administrative requirements of this Section apply to all of the following Sections of the Specification which are involved in alterations to the existing building.

B. Extent Notes: Cut into or partially remove portions of the existing building as necessary to make way for new construction. Include such work as:
   1. Cutting, moving, or removal of items shown to be cut, moved, or removed.
   2. Cutting, moving, or removal of items not shown to be cut, moved, or removed, but which must be cut, moved, or removed to allow new work to proceed. Work or items which are to remain in the finished work shall be patched or reinstalled after their cutting, moving, or removal, and their joints and finishes made to match adjacent or similar work.
   3. Removal of existing surface finishes as needed to install new work and finishes.
   4. Removal of abandoned items and removal of items serving no useful purpose, such as abandoned piping.
   5. Repair or removal of dangerous or unsanitary conditions resulting from alterations work.

1.02 SCHEDULING AND ACCESS:

A. Work Sequence: Contractor shall submit detailed project plan with work sequence and phasing schedule.

B. Security:
   1. Be solely responsible for job site security.
   2. Protect completed work and stored items from vandalism and theft.
   3. Contact Owner for access to all security areas.

C. Temporary Barricades:
   1. Provide and erect barricades as necessary to protect ground personnel, employees, passersby, etc., from hazards resulting from the Work during construction operation.
   2. Prevent public access to construction activities, equipment, and storage areas.

1.03 ALTERATIONS, CUTTING AND PROTECTION:

A. Extent:
   1. Perform cutting and removal of deck work so as not to cut or remove more than is necessary and so as not to damage adjacent work.
   2. Conduct work in such a manner as to minimize noise and to minimize accumulation and spread of dirt and dust.
   3. Perform cutting for ductwork and other rectangular openings with carborundum saw with approved dust arrestor.

B. Securement of Openings: Protect all openings made in existing roofs, etc., with barricades to prevent accidents to U.S. Government's and Contractor's personnel. If required by U.S. Government, provide a workman at ground level inside the building at all times during the tear-off operations and when the roof deck or roofing is being installed. It will be the responsibility of this individual to alert personnel in the area of the work being performed overhead, to watch for falling debris, and to broom clean the area each day of any dirt that may result from the roof replacement operations.

C. Responsibility and Assignment of Trades:

1. Contractor shall assign the work of moving, removal, cutting, patching, and repair to trades under his supervision so as to cause the least damage to each type of work encountered, and so as to return the building as much as possible to the appearance of new work.
2. Patching of finish materials shall be assigned to mechanics skilled in the work of the finish trade involved.

D. Protection:
1. Protect remaining finishes, equipment, and adjacent work from damage caused by cutting, moving, removal, and patching operations. Protect surfaces which will remain a part of the finished work.
2. Cover existing walls and floors where necessary to prevent damage from construction operations.
3. During demolition, cutting, and construction, provide positive dust control by wetting dusty debris and by completely sealing openings to occupied areas with temporary seals so as to prevent spread of dust and dirt to interior areas.
4. After materials are installed, properly protect Work until final acceptance.
5. Repair any damage resulting from construction operations without cost to U.S. Government.
6. Provide continuous security at openings cut into existing exterior walls and roofs during non-working hours. Prevent unauthorized entry into the existing facility through areas demolished or accessed as part of the Work.

E. Special Protection:
1. Comply with welding and cutting precautions specified in Section 01500 - Temporary Facilities and Controls. In addition, provide Type I fire retardant enclosure around area of welding.
2. Provide temporary weather protection over open roof penetrations until final flashing is completed.
3. During equipment handling, provide a roof applicator at project with sufficient materials for temporary patching and sealing.
4. Provide roof applicator at jobsite continuously during rainstorms which may occur while job is in progress to make temporary or emergency repairs.

F. Debris:
1. Remove debris from the site daily. Removed material becomes property of the Contractor. Load removed material directly on trucks for removal from site. Dispose of removed material legally. Do not allow debris to enter sewers.
2. Do not allow material accumulations to endanger structure.
3. Cover and secure material accumulations as necessary to prevent the material from spreading over the rooftop or becoming airborne.
4. Submit material storage and disposal plan for review prior to job start.

1.04 PATCHING, EXTENDING, AND MATCHING:

A. Patch and extend existing work using skilled mechanics who are capable of matching the existing quality of workmanship. The quality of patched or extended work shall not be less than that which exists.

B. In areas where any portion of an existing finished surface is damaged, lifted, stained, or otherwise made or found to be imperfect, patch or replace the imperfect portion of the surface with matching material.

C. Provide adequate support or substrate for patching of finishes.

D. Quality:
1. In the Sections of the product and execution of Specifications which follow these General Requirements, no concerted attempt has been made to describe each of the various existing products that must be used to patch, match, extend, or replace existing work. Obtain all such products in time to complete the Work on schedule.

Such products shall be provided in quality which is in no way inferior to the existing products.

2. The quality of the products that exist in the building, as apparent during pre-bid site visits, shall serve as the Specification requirement for strength, appearance, and other characteristics.

E. Transitions:
   1. Where new work abuts or finishes flush with existing work, make the transition as smooth and workmanlike as possible. Patched work shall match existing adjacent work in texture and appearance so as to make the patch or transition invisible to the eye at a distance of no closer than 1m (3 feet).
   2. Where plaster, masonry, or other finished surface is cut in such a way that a smooth transition with new work is not possible, terminate the existing surface in a neat fashion along a straight line at a natural line of division and provide trim appropriate to the finished surface.

F. Restore existing work that is damaged during construction to a condition equal to its condition at the time of the start of the Work, and to satisfaction of Government's Representative.

1.05 REPAIR:

A. Replace work damaged in the course of alterations, except at areas approved by Government's Representative for repair.
B. Where full removal of extensive amounts of almost-suitable work would be needed to replace damaged portions, then filling, straightening, and similar repair techniques, followed by finishing, will be permitted.
C. If the repaired work is not brought up to the standard for new work, Government's Representative will direct that it be cut out and replaced with new work.

PART TWO - PRODUCTS

Not Used.

PART THREE - EXECUTION

Not Used.

END OF SECTION 01120

SECTION 01200

PROJECT MEETINGS

PART ONE - GENERAL

1.01 PRE-CONSTRUCTION CONFERENCE:

A. A Pre-construction Conference may be held at the site at a time to be designated by U.S. Government's Representative.
B. Representatives of Contractor, including project superintendent and foreman (who speak and write in the English language) shall meet with U.S. Government's Representative.

1.02 AGENDA:

A. As a minimum, the following items will be on meeting agenda:
   1. Designation of all personnel.
   2. Communication.
   3. Construction Schedule.
   4. Critical work sequencing and deck repair procedures.
   5. Existing facilities and maintenance of operation.
   6. Submittals procedures.
   7. Project record documents procedures.
   8. Processing Field and Change Orders.

1.03 AGENDA FOR PRE-CONSTRUCTION MEETING

A. Attendance:
   1. U.S. Government (U.S. Government Representative, if desired by Government).
   2. Consultant Representative.
   3. Contractor (Manager, Superintendent, and Foreman).
B. Sign-in list for attendees.
C. Job Site Conditions and Requirements:
   1. Services (temporary):
      a. Water.
      b. Power.
      c. Sanitary facilities.
      d. Review each of the above as to who shall furnish each, restrictions, and scheduling.
   2. Site Access and Restrictions:
      a. Set-up areas, material storage, and handling.
      b. Protection of buildings, grounds, and building interior.
   3. Working Area and Preparation:
      a. Review work flow and schedule.
      b. Preparation work by other trades.
      c. Protection of existing roof and deck.
D. Technical Sections:
   1. Review submittals.
   2. Function of on-site inspector and other on site personnel.
   3. Material storage methods.
   4. Roof drainage conditions.
   5. Coordination of work with the U.S. Government.
   6. System review.
E. Safety and Security - Review Contractor responsibilities, and establish Government monitoring procedures.
F. Summary and Questions.
G. Issue record of meeting minutes to all attendees.

PART TWO - PRODUCTS

Not Used.

PART THREE - EXECUTION

Not Used.

END OF SECTION 01200

SECTION 01300

SUBMITTALS

PART ONE - GENERAL

1.01 SECTION INCLUDES:

A. Submittals required by Specification Sections and as listed in attached List of Submittals.

1.02 REQUIRED SUBMITTALS:

A. Applicator's License Certificate: Copy of the roofing material manufacturer's agreement/contract indicating date application was approved and expiration date.
B. Material manufacturer's written approval/acceptance of specified warranty for project, fastener pattern layout, details, insulation, and all related materials based upon existing site conditions.
C. Shop drawings of details, if proposed different from project drawings.
D. Manufacturer’s product data sheets and Material Safety Data Sheets (MSDS) on each material proposed for usage.
E. Sample of warranty that is to be issued upon project completion.
F. Detailed project schedule showing work phasing and proposed daily progress schedule.

1.03 SHOP DRAWINGS:

A. Original drawings, prepared by Contractor, subcontractor, supplier, or distributor, which illustrate some portion of the Work, showing fabrication, layout, setting, or erection details, prepared by a qualified detailer.
B. Prepare shop drawings for those details that are proposed different than the project drawings. Indicate on a roof plan, the proposed location of detail presented on shop drawing.
C. Indicate joints, types, and locations of fasteners, shapes, sizes, expansion joints, special conditions, and installation procedures for each flashing condition. Note critical dimensions, gauge, and finish of sheet metal for each flashing condition.
D. Submit shop drawings showing layout, joining, profiles, and anchorages of fabricated work, including major counterflashings, trim, and fascia units, downspouts, scuppers, and expansion joint systems.

1.04 PRODUCT DATA:

A. Submit manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other standard descriptive data for each material proposed for use in construction of roof assembly and related flashings and components.
    1. Clearly mark each copy to identify pertinent materials, products, or models.
    2. Show dimensions and clearances required.
    3. Show performance characteristics and capacities.
    4. Indicate the Specification Section that applies to each submittal.

1.05 SAMPLES:

A. Physical examples to illustrate materials, equipment, and workmanship; and to establish standards by which completed Work is judged, if requested.

1.06 CONTRACTOR RESPONSIBILITIES:

A. Review shop drawings, product data, and samples prior to submission. Initial, sign, or stamp, certifying the Contractor's review of the submittal.
B. Verify:

1. Field measurements.
2. Field construction criteria.
3. Catalog numbers and similar data.

C. Coordinate each submittal with requirements of Work and of Contract Documents.
D. Contractor's responsibility for errors and omissions in submittals is not relieved by Government's COR review of submittals.
E. Contractor's responsibility for deviations in submittals from requirements of Contract Documents is not relieved by the Government's COR review of submittals, unless Government's COR gives written acceptance of specific deviations.
F. Notify Government's COR, in writing at time of submission, of deviations in submittals from requirements of Contract Documents.
G. Begin no work which requires submittals until return of submittals with Government's COR's stamp and initials or signature indicating review and indication to proceed as noted. Work performed prior to submission and approval of submittals may be subject for rejection.
H. Distribute copies after Government's COR's approval.

1.07 SUBMISSION REQUIREMENTS:

A. Schedule submissions to the Government's COR immediately after Contract award.
B. Submit copies of submittals in electronic PDF format to COR.
C. Accompany submittals with electronic transmittal letter containing:
   1. Date.
   2. Project title and number.
   3. Contractor's name and address.
   4. The number of each submittal.
   5. Notification of deviations from Contract Documents.
D. Provide set of submittals combined together in one PDF document with a Cover and Table of Contents.

1.08 RE-SUBMISSION REQUIREMENTS:

A. Product Data and Samples: Submit new data and samples as required for initial submittal.
B. Shop Drawings:
   1. Revise initial drawings as required and re-submit as specified for initial submittal.
   2. Indicate on drawings any changes which have been made other than those requested by Government's On-site Representative.

1.09 DISTRIBUTION OF SUBMITTALS AFTER REVIEW:

A. Government's COR will retain a copy of approved or corrected submittals.
B. Government's COR will forward a copy of approved or corrected submittals to Post.
C. Government's COR will return a copy of approved submittals to Contractor.
D. Contractor shall distribute approved submittals as required for construction, including Contractor’s file, jobsite file, subcontractors, suppliers, and/or fabricators.
E. Maintain one set of complete instructions at jobsite during installation and until completion.

1.10 LIST OF SUBMITTALS:

SECTION 01300 - SUBMITTALS

Submittals - 1 electronic PDF document.

SECTION 01600 - MATERIAL AND EQUIPMENT

Substitution Request Form - 1 PDF document.

SECTION 01700 - CONTRACT CLOSEOUT
Warranties and Bonds.
Evidence of Payment and Release of Liens.

SECTION 02072 - MINOR DEMOLITION AND RENOVATION WORK
Product Data and MSDS.

SECTION 03610 - EPOXY RESIN INJECTION
Product Data and MSDS.
Equipment.
Manufacturer's Written Installation Instructions.
Shop Drawings.
Injection Results Report.
Experience Documentation.

SECTION 03730 - CONCRETE REHABILITATION
Product Data and MSDS.
Manufacturer's Installation Instructions.
Samples and Mock-ups.

SECTION 07220 - ROOF AND DECK INSULATION
Product Data and MSDS.
Shop Drawings, where applicable.
Samples, if requested.
Manufacturer's Installation Instructions.

SECTION 07533 - THERMOPLASTIC SINGLE-PLY ROOF SYSTEM
Product Data and MSDS.
Shop Drawings, where applicable.
Samples, if requested.
Manufacturer's Installation Instructions.

SECTION 07620 - SHEET METAL FLASHING AND TRIM
Product Data and MSDS.
Shop Drawings, where applicable.
Samples, if requested.
Color Chart.

SECTION 07920 - SEALANTS AND CAULKING
Product Data and MSDS.
Samples and Mock-ups, if requested.
Color Charts for each material proposed for use.

SECTION 09830 - ELASTOMERIC ARCHITECTURAL COATING
Product Data and MSDS.
Color Charts.
Color Samples.
Manufacturer's Installation Instructions.
Mock-ups.

PART TWO - PRODUCTS

Not Used.

PART THREE - EXECUTION

Not Used.

END OF SECTION 01300

SECTION 01400

QUALITY CONTROL

PART ONE - GENERAL

1.01 ECTION INCLUDES:

A. General Quality Control.
B. Manufacturers' Field Services.

1.02 QUALITY CONTROL, GENERAL:

A. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship to produce work of specified quality.
B. Contractor shall be approved by manufacturer to perform the work for the specified guarantee period. Contractor shall have completed previous projects utilizing same materials and provide same warranty as specified herein.
C. Examine each phase of Work and have defective conditions corrected before starting subsequent operations which would cover, or are dependent upon, work in question.
D. Where visual examination is not sufficient, such as in verifying slope of roof deck for proper drainage, use instruments with qualified operators to examine work.
E. Perform demolition and new material installation using full-time employees of the Contractor.

1.03 WORKMANSHIP:

A. Comply with industry standards, except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
B. Utilize qualified personnel who have experience with the specified materials to produce workmanship of specified quality.
C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.
D. Provide finishes to match accepted samples.

1.04 MANUFACTURER'S FIELD SERVICES:

A. When specified in respective Specification Section, require manufacturer to provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, and to make appropriate recommendations.
B. Notify manufacturer's representative a minimum of two weeks prior to date of final inspection. Manufacturer's representative shall conduct an inspection of the completed work before the final inspection, or shall attend the final inspection.

PART TWO - PRODUCTS

Not Used.

PART THREE - EXECUTION

Not Used.

END OF SECTION 01400

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

PART ONE - GENERAL

1.01 SANITARY FACILITIES:

A. Provide adequate temporary chemical toilets at time Work is commenced.
B. Maintain facilities in compliance with applicable health laws and regulations. Keep clean and unobtrusive.
C. Upon completion of Work, remove these facilities and all traces thereof.

1.02 STORAGE OF MATERIALS:

A. Provide suitable non-combustible, watertight and weathertight coverings for storage of materials subject to damage by weather. Covering shall be of sufficient size to hold materials required on site at one time. Pallets shall be raised at least 150mm (6-inches) above ground.
B. If temporary storage sheds are used, locate storage areas where directed, maintain in good condition, and remove storage sheds when so directed. Locate storage areas of combustible construction a minimum of 10m (30 feet) from existing building.
C. Store materials on site unless otherwise approved by Government.
D. Cover and protect materials subject to damage by weather, including during transit.
E. Do not use building as storage facility.
F. Provide additional storage at no cost to the U.S. Government in the event that additional storage area is required beyond that provided at project site.
G. Stored materials shall be available for inspection by Government's COR at all times.
H. Store flammable and volatile liquids in sealed containers located a minimum of 10m (30 feet) from existing buildings.
I. Transport flammable or volatile liquids in, and use from, U.L. listed safety cans.
J. Deliver material and equipment in manufacturer's original packaging with all tags and labels intact and legible. Handle and store material and equipment in such a manner as to avoid damage. Liquid products shall be delivered sealed, in original containers. Store appropriate roll goods in an upright position.
K. Proper storage of materials is the sole responsibility of Contractor. Protect all materials susceptible to moisture in dry, above ground, watertight storage. Keep all labels intact and legible, clearly showing the product, manufacturer, and other pertinent information.
L. Reject any materials becoming wet or damaged and remove from the jobsite immediately. Any material found to be improperly stored at the jobsite shall be considered wet at the discretion of Government's COR and removed from the jobsite.
M. Random samples of all materials susceptible to moisture will be taken at various stages of the installation to ensure no significant variations in moisture.
N. Distribute material, debris, and equipment over the roof deck to avoid damage to the roof system and structural deck. Not more than two weeks supply of material shall be stored on a roof at any given time. Place materials and equipment to be stored on the roof as nearly direct over structural members as can be determined. Secure equipment, material, and debris on the roof to prevent movement by wind or other elements. Contractor assumes full responsibility for loading on the structural deck or roofing materials during the work. Government's COR reserves the right to reject any loadings deemed unacceptable.

1.03 TEMPORARY WATER:

A. Make arrangements with Government's COR for water required for construction. Government will pay for costs of water.

B. Provide hoses for conveyance.

1.04 TEMPORARY ELECTRICAL ENERGY:

A. Make arrangements with Government's On-site Representative for temporary electrical service for completion of the Work. Government will pay energy charges for temporary power and lighting.
B. Provide all necessary temporary wiring (in conduit if requested by Government's COR), extensions, and temporary lighting devices.
C. Provide necessary provisions to avoid disruptions to U.S. Government's electrical service and daily operations.
D. Restore wiring to its original condition at the completion of the work.

1.05 TEMPORARY LADDERS, SCAFFOLDS, HOISTS:

A. Furnish and maintain temporary ramps, scaffolds, hoists, or chutes as required for proper execution of Work.
B. Such apparatus, equipment, construction, and installation shall meet requirements of applicable federal, state, and local safety and labor laws.

1.06 GUARDRAILS, BARRICADES, AND TEMPORARY COVERINGS:

A. Provide and erect barricades as required to protect natural resources, site improvements, existing property, adjacent property, vehicles, and passers-by.
B. Where pedestrian traffic is through or adjacent to work areas, provide necessary guardrails and barricades to protect pedestrians and to prevent pedestrian access to Work areas.
C. Remove guardrails and barricades at completion of construction.
D. Provide suitable temporary watertight coverings over windows, exterior walls, and roof openings as required to protect interior equipment from inclement weather.
E. Provide suitable protection for stairs, elevator, and/or walls and floors in areas used for contractor roof access.
F. Provide temporary 2m (6-foot) chainlink fence around storage and setup areas.

1.07 PROTECTION:

A. Maintain bench marks, monuments, and other reference points. If disturbed or destroyed, replace as directed.
B. Protect existing adjacent streets, sidewalks, curbs, buildings, and property including trees, lawns, and plants.
C. Refer to Section 01120 - Alterations Project Procedures for protection requirements of existing building.

1.08 TEMPORARY FIRE PROTECTION:

A. During construction, Contractor shall comply with fire safety practices as outlined in NFPA Pamphlet 241 and local fire protection codes, and in addition shall:
    1. Provide following stored pressure extinguishers during entire construction period:
        a. One U.L. rating 4A-60B:C dry chemical fire extinguisher.
        b. One U.L. rating 2A 10l (2-1/2 gallon) water fire extinguisher.
        c. One U.L. rating 10B:C carbon dioxide fire extinguisher with horn and hose assembly.
    2. Provide fire extinguishers together in each of following areas:
        a. Each 300m_2 (3,000 square feet) of work area or fraction thereof.
        b. Each temporary structure including construction office and storage and tool and workshop sheds.
    3. Contractor's superintendent or other assistant superintendents shall be appointed as project fire warden for entire construction period.
    4. Train workmen in proper use of each type fire extinguisher.

5. Post telephone number of fire department, specific information regarding location of on-site firefighting equipment, and procedures to be followed in event of fire.
6. Maintain free access at all times to fire extinguisher equipment, street fire hydrants, and outside connections for standpipe hose systems.
7. Maintain all exit facilities and access thereto, free of material and other obstructions.
8. Take all necessary precautions to prevent unintended ignition of combustible materials during installation of roofing materials with propane torch.
9. Utilize procedures and/or provide necessary fire blocks/screens and/or barriers during installation to prevent exposure of materials to open flame or excessive heat that would cause unintended ignition of materials.

1.09 EMPLOYEE CONTROL:

A. Do not allow construction employees to enter occupied areas. Maintain construction traffic in designated access routes.

1.10 PARKING FACILITIES:

A. Parking area for a designated number of construction personnel vehicles will be made available at the site by Government's COR.

1.11 CLEANING DURING CONSTRUCTION:

A. Oversee cleaning and ensure that building and grounds are maintained free from accumulations of waste materials and rubbish.
B. Sprinkle dusty debris with very fine water mist to control accumulation of dust. Do not use water in quantity so as to puddle.
C. At not less than every day during progress of work, cleanup work areas and access areas and dispose of waste materials, rubbish, and debris.
D. At Contractor's option, on-site dump containers may be used for collection of waste materials, rubbish, and debris. Locate containers a minimum of 10m (30 feet) away from building entrances at a location acceptable to Owner. If used, remove containers when filled.
E. Do not allow waste materials, rubbish, and debris to accumulate and become an unsightly or dangerous condition.
F. Remove waste materials, rubbish, and debris from site and legally dispose of at public or private dumping areas off Owner's property.
G. Keep streets and access to site free of rubbish and debris.
H. Lower waste materials in a controlled manner with as few handlings as possible. Do not drop or throw materials from heights.

1.12 LEAK (WATER) DAMAGE CONTROL:

A. In the event of rain during roof replacement, immediately inspect interior of building for leaks.
B. Coordinate with Government's COR for access to building.
C. Continue to inspect building on a regular basis until rain ceases.
D. If leaks are discovered during rains, immediately cover and protect equipment with fire retardant sheeting in the area of the leak. Immediately notify Government's COR of leak condition.
E. Perform emergency repairs on roofing and exterior walls to stop leaks.
F. Take all necessary precautions to protect the existing roof system and exterior walls from damage. Repair areas of roof and exterior walls damaged by Work performed by the Contractor, at Contractor's expense. Government's COR shall determine damage caused by Contractor.
G. Contractor is to be aware of the potential for leaks in the existing roof and exterior walls. Contractor is to take all necessary precautions to prevent damage to the existing roof

and exterior walls. All damage to the existing roof and exterior walls that could result in leaks is to be repaired on a daily basis by Contractor.

1.13 PERMITS:

A. Obtain and pay for all required local permits, licenses, and registrations. Work may be subject to ordinances, laws, codes, and regulations.
B. Prior to bidding, notify Government's COR of any violation, omission, or questions of compliance. Required corrections to Specifications will be made via Addenda prior to receipt of Bids.
C. Be responsible for full compliance and bear cost of additional work not specified that may be required by authorities having jurisdiction.

1.14 REGULATORY REQUIREMENTS:

A. International Building Code (IBC), latest edition.
B. Occupation Safety and Health Administration (OSHA) requirements, as applicable.
C. United States Environmental Protection Agency (EPA) requirements, as applicable.
D. Adhere to all limitations, cautions, and regulatory standards referenced by the manufacturer of each material provided.

PART TWO - PRODUCTS

Not Used.

PART THREE - EXECUTION

Not Used.

END OF SECTION 01500

SECTION 01600

MATERIAL AND EQUIPMENT

PART ONE - GENERAL

1.01 SECTION INCLUDES:

A. Material and Equipment Incorporated Into Work:
   1. Conform to applicable specifications and standards.
   2. Comply with size, make, type, and quality specified, or as specifically approved in writing by Government's COR.
   3. Manufactured and Fabricated Products:
      a. Design, fabricate and assemble in accordance with recognized industry standards.
      b. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.
      c. Two or more items of same kind shall be identical, by same manufacturer.
      d. Products suitable for service conditions.
      e. Adhere to equipment capacities, sizes, and dimensions shown or specified unless variations are specifically approved in writing.

B. Do not use material or equipment for purposes other than that for which it is designed or is specified.

1.02 REUSE OF EXISTING MATERIAL:

A. Except as specifically indicated or specified, materials and equipment removed from existing structure shall not be used in completed Work.
B. For material and equipment specifically indicated or specified to be reused in Work:
   1. Use special care in removal, handling, storage, and reinstallation to assure proper function in completed Work.
   2. Arrange for transportation, storage, and handling of products which require off-site storage, restoration, or renovation. Pay costs for such work.

1.03 MANUFACTURER'S INSTRUCTIONS:

A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in installation, including two copies to Government's COR.
   1. Maintain one set of complete instructions at jobsite during installation and until completion.
   2. Submit two copies to Government's COR with appropriate Product Data submittal.
   3. Government's COR will forward electronic copy to Post and OBO.
B. Handle, install, connect, clean, condition, and adjust products in strict accordance with such instructions and in conformity with specified requirements.
   1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Government's COR for further instructions.
   2. Do not proceed with work without clear instructions.
C. Perform Work in accordance with manufacturer's instructions. Do not omit preparatory steps or installation procedures unless specifically modified or exempted by Contract Documents.

1.04 TRANSPORTATION AND HANDLING:

A. Arrange deliveries of products in accordance with construction schedules. Coordinate to avoid conflict with work and conditions at site.

1. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that products are properly protected and undamaged.

B. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

1.05 SUBSTITUTIONS AND PRODUCT OPTIONS:

A. Contractor's Options:
1. For products specified only by reference standard, select any product meeting that standard, by any manufacturer.
2. For products specified by naming several products or manufacturers, select any product and manufacturer named.
3. Products specified by naming only one product and manufacturer are to establish a quality standard. For products other than the named product, submit request for substitution as specified below.

B. Substitutions:
1. During Bidding, Government's COR will consider written requests from Contractor and manufacturers for substitutions of products in place of those specified. Approval of proposed substitutions will be set forth in an Addendum or letter of approval. Requests for substitutions shall include data listed below.
2. Submit two copies of request for each substitution, supported with complete data, drawings, and appropriate samples substantiating compliance of proposed substitution with Contract Documents, including:
   a. Product description, performance and test data, and applicable reference standards.
   b. Name and address of similar projects on which product was used and date of installation.
   c. Itemized comparison of qualities of proposed substitution with that specified.
   d. Changes required in other elements of Work because of substitution.
   e. Affect on construction schedule.
   f. Availability of maintenance service and source of replacement materials.

C. Contractor's Representation: Request for substitution constitutes a representation that Contractor:
1. Has investigated proposed product and determined that it is equal to or superior in all respects to that specified.
2. Will provide same warranties for substitution as for product specified.
3. Will coordinate installation of accepted substitution into Work and make such other changes as may be required for Work to be complete in all respects.
4. Waives all claims for additional costs, under his responsibility, related to substitution which subsequently becomes apparent.

D. Substitutions will be not be considered if:
1. They are indicated or implied on Shop Drawings or Product Data submittals without formal request submitted in accordance with this Section.
2. They are submitted after time limit specified above.
3. Acceptance will require substantial revision of Contract Documents.

E. If substitution is not approved or accepted, Contractor shall furnish specified product.

PART TWO - PRODUCTS

Not Used.

PART THREE - EXECUTION

Not Used.

END OF SECTION 01600

SECTION 01710

CLEANING

PART ONE - GENERAL

1.01 GENERAL:

1. Maintain premises free from accumulations of waste, debris, and rubbish caused by construction operations.
2. At completion of Work, remove waste materials, rubbish, tools, equipment, machinery, and surplus materials. Clean all sight-exposed surfaces. Leave project clean and ready for occupancy.

1.02 REQUIREMENTS OF REGULATORY AGENCIES:

A. Codes and Standards: Applicable federal, state, and local codes and regulations relative to environmental safety regulations.
B. Hazards Controls: Store volatile waste in covered metal containers and remove from premises daily. Prevent accumulation of wastes which create hazardous conditions.
C. Pollution Control: Conduct clean-up and disposal operations to comply with local ordinances and anti-pollution laws.
    1. Burning or burying of rubbish and waste materials on the project site is prohibited.
    2. Disposal of volatile fluid wastes (such as mineral spirits, oil, or paint thinner) in storm or sanitary sewer systems or into streams or waterways is prohibited.
    3. Comply with local and national/country regulations regarding collection and disposal of water runoff resulting from power washing the exterior of the building.

PART TWO - PRODUCTS

2.01 CLEANING MATERIALS:

A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART THREE - EXECUTION

3.01 URING CONSTRUCTION:

A. Keep work area and all occupied property in neat and orderly condition at all times. Oversee cleaning and ensure that building and grounds are maintained free from accumulations of waste materials and rubbish. Sprinkle dusty debris with very fine water mist to control accumulation of dust. Do not use water in quantity so as to puddle. Do not allow waste and other materials such as rubbish, debris, wrappers, etc., to accumulate and become unsightly or hazardous. Promptly remove equipment and excess materials as they become no longer needed for the progress of the work. At not less than every day during progress of work, clean up work and access areas and dispose of waste materials, rubbish, and debris.
B. Legally dispose of waste materials, rubbish, and debris at public or private dumping areas off Government's property. At the completion of work, restore work area to its original condition. Lower waste materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights. Keep street and access to site, free of rubbish and debris.

C. Contractor shall be responsible for damage to or destruction of property of any sort resulting from the work or caused by defective work, or the use of unsatisfactory materials or workmanship.
D. Contractor shall be responsible for the preservation of all private property, trees, fences, etc., along the adjacent street, right-of-way, etc., and shall use every precaution necessary to prevent damage or injury thereto. Use suitable precautions to prevent damage to pipes, conduits, and other structures.
E. If damage to any structures, utilities, or other improvement occurs by reason of Contractor's operations even though special precautions have been employed, Contractor shall be entirely responsible for such damage and shall make all repairs as required to the satisfaction of Government's COR.
F. Do not injure, destroy, or trim landscaping without authorization by Owner. Landscaping damage will be replaced by Contractor with new stock or with other stock satisfactory to Government's COR at the expense of Contractor.

3.02 FINAL CLEANING:

A. Employ skilled workmen for final cleaning.
B. Remove grease, mastics, adhesives, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed interior and exterior surfaces.
C. Repair, patch, and touch-up marred surfaces to match adjacent finishes.
D. Broom clean paved surfaces; rake clean other surfaces of grounds.
E. Powerwash or utilize other acceptable method to remove contamination on paved surfaces due to work activities.
F. Clean stairwell, elevator, storage area, and other building areas affected by work activities.
G. Prior to final completion or occupancy, conduct an inspection of sight-exposed interior and exterior surfaces and all work areas to verify that entire Work area is clean.

END OF SECTION 01710

SECTION 02072

MINOR DEMOLITION AND RENOVATION WORK

PART ONE - GENERAL

1.01 ECTION INCLUDES:

A. Removal of existing sealants at concrete wall control joints, door perimeters, and existing wet-seal joints.
B. Preparation of the existing coating system.
C. Preparation and repair of roof deck.
D. Demolition of curbs.
E. Modification of existing roof penetrations, equipment supports or curbs, pitch pans, reglets, piping, and electrical service to provide proper flashing height and flashing detail.
F. Modification and renovation of existing scupper drains, scuppers, and drainage system.
G. Rerouting condensate lines, electrical conduit, and other rooftop piping.
H. All other miscellaneous and incidental work required to install complete roofing system as specified and to obtain specified manufacturer's warranty.

1.02 RELATED SECTIONS:

A. 03730 - Concrete Rehabilitation.
B. 03750 - Corrosion Inhibiting Coating.
C. 04500 - Masonry Restoration and Cleaning.
D. 07180 - Water Repellent Sealer.
E. 07220 - Roof and Deck Insulation.
F. 07533 - Thermoplastic Single-ply Roof System.
G. 07620 - Sheet Metal Flashing and Trim.
H. 07920 - Joint Sealants.

1.03 REFERENCES:

A. American Society for Testing and Materials (ASTM).
B. Corps of Engineers (CRD).

1.04 SUBMITTALS:

A. Submit product data on all materials specified.

1.05 PROJECT CONDITIONS:

A. Environmental Requirements:
   1. Do not remove, open up areas, or make penetrations in deck during inclement weather. Do not remove existing sealants, concrete, or plaster in inclement weather or when rain is predicted with 30 percent possibility.
   2. When ambient temperature is below 15 degrees Celsius (60 degrees Fahrenheit), expose only enough waterproofing material required within four hour period.
   3. Do not expose waterproofing material and accessories to constant temperature in excess of 82 degrees Celsius (180 degrees Fahrenheit).
B. Emergency Equipment: Maintain on-site materials necessary to apply emergency temporary seal in event of sudden storms or inclement weather.
C. Smoking is prohibited on roof areas or in existing building.

1.06 SEQUENCING AND SCHEDULING:

A. Sequence minor demolition and renovation with sequence of new work to maintain facility in dry, watertight condition.

B. Coordinate material removal so that no more existing items are removed in one day than can be replaced with new materials in same day.
C. Coordinate work with Owner's operational requirements.
D. Coordinate demolition work and removal with new work to maintain facility in dry, watertight condition.

1.07 WARRANTY:

A. Provide Contractor's warranty covering defects in installed materials and workmanship for period of two years from date of final acceptance.

PART TWO - PRODUCTS

2.01 MATERIALS:

A. Treatment for Wood Members: Pressure preservative treated in accordance with AWPA C2, C9 standards, Above Ground Contact such as Alkaline copper quat (ACQ-C) or Micronized copper quat (MCQ), at 4kg/m3 (0.25 pounds per cubic foot)
B. Lumber for Nailers and Blocking: Standard Grade Fir or No. 2 Southern Yellow Pine bearing UL label. Size shall be appropriate for application, minimum 50mm (2-inch) (nominal) thickness, pressure-treated and kiln dried after treatment.
C. Plywood: Minimum 18mm (3/4-inch) APA fire rated sheathing, "EXP 1" or "exterior", fire rated, bearing APA trademark.
D. Gypsum Sheathing: 13mm (1/2-inch) thick moisture resistant gypsum core with pre-treated fiberglass facer, such as "Dens-Deck Prime Roof Guard" by Georgia Pacific or "SecuRock Roof Board" by USG.
E. Fasteners:
    1. Wood Substrate:
        a. Securement of metal flanged items such as flashing pans, metal edge/fascia, cleats, etc., shall be nails, No. 11 gauge, stainless steel wire with 9mm (3/8-inch) diameter head and 38mm (1-1/2-inch) long ring shank such as "R-103-A Stormguard Asphalt and Fiberglass Shingle Nail" by Maze Nails (800/435-5949).
        b. Securement of wood to wood shall be nails, No. 11 gauge, stainless steel wire nail with ring shank and 7mm (9/32-inch) diameter head such as "Stormguard PTL Anchor-Down Nail" by Maze Nails (800/435-5949); 10d or length required to provide 25mm (1-inch) penetration minimum into substrate.
        c. Securement of exposed items to wood substrate shall be No. 14 stainless steel screw with stainless steel washer and integral rubber seal; length required to provide 25mm (1-inch) penetration minimum into substrate.
        d. Fasteners for securing roofing materials to wood substrate shall be a stainless steel nail with a 25mm (1-inch) diameter round head and ring shank; length to provide 25mm (1-inch) penetration into substrate, as manufactured by Simplex Nail Co.
        e. Fasteners for securing steel to wood substrate shall be No. 14 stainless steel wood screw with stainless steel washer and integral rubber seal, length to achieve 25mm (1-inch) embedment into wood.
        f. Fasteners for securing wood nailer to wood nailer in vertical position shall be 20 gauge hot dipped galvanized steel plate, 50mm by 100mm (2-inches by 4-inches) such as “MP 24 Mending Plate” by Simpson Strong-Tie Co., Inc. and “A34 Framing Anchor” by Simpson Strong-Tie Co., Inc. for corner connections.
    2. Concrete Substrate:
        a. Fasteners for securing sheet metal items to concrete substrate shall be a pre-assembled drive anchor with a stainless steel drive screw, a lead/zinc alloy expansion anchor body (6mm [1/4-inch] diameter, 38mm [1-1/2-inch] length) and

a stainless steel washer with integral rubber seal 28mm (1-1/8-inch) diameter such as "Zamac Hammer-Screw" as manufactured by Powers Rawl.

b. Fasteners for securing wood blocking to concrete substrate shall be stainless steel sleeved stud expansion bolt, 13mm (1/2-inch) diameter (minimum), with 18mm (3/4-inch) diameter stainless steel washer such as "Kwik Bolt II" by Hilti.

3. Masonry Substrate:
   a. Fasteners for securing wood to solid masonry shall be stainless steel expansion anchor, 9mm (3/8-inch) diameter (minimum), with 18mm (3/4-inch) diameter stainless steel washer such as "Countersunk Kwik Bolt II" by Hilti.
   b. Fasteners for securing wood to hollow base masonry shall be 9mm (3/8-inch) diameter (minimum), stainless steel threaded rod, with 18mm (3/4-inch) diameter washer, nut, and screen tube such as "HIT C-20 Adhesive Anchor" by Hilti.
   c. Fasteners for securing sheet metal items to concrete substrate shall be a pre-assembled drive anchor with a stainless steel drive screw, a lead/zinc alloy expansion anchor body (6mm [1/4-inch] diameter, 38mm [1-1/2-inch] length) and a stainless steel washer with integral rubber seal 28mm (1-1/8-inch) diameter such as "Zamac Hammer-Screw" as manufactured by Powers Rawl.
4. Steel Substrate:
   a. Fasteners for securing wood to steel sheet metal substrate shall be self-drilling coated heavy duty screw, 6mm (1/4-inch) diameter (minimum), with 16mm (5/8-inch) diameter washer such as "No. 14 Heavy Duty Screw" by OMG.
   b. Fasteners for securing wood to structural steel substrate shall be stainless steel through bolt, 9mm (3/8-inch) diameter with 18mm (3/4-inch) diameter washer head and nut.
   c. Fasteners for securing steel to steel substrate shall be self-tapping No. 14, stainless steel screw with stainless steel washer and bonded integral rubber seal.
5. Plywood Clip: 18 gauge galvanized steel H-clip such as "PSCL Plywood Sheathing Clip" by Simpson Strong-Tie Co., Inc.
6. Receiver in Reglet: Soft, malleable lead sheet, size and shape to fit in joint and maintain compression against receiver.

F. Rust Inhibitive Primer: 100 percent acrylic resin primer such as “Metalclad Interior-Exterior Acrylic Latex Flat Primer & Finish #41702”, Devoe & Raynolds Co.

G. Piping/Conduit Supports: Pre-manufactured assembly with molded plastic/rubber base, 250mm by 400mm (10-inches by 16-inches); 13mm (1/2-inch) threaded rods and accessory bar, "Type SS8-R", "Type SS8-C", or "Type PP-10 with Strut” for conduit/condensate or “Type PP-10 with Roller” for steel/gas piping as manufactured by Portable Pipe Hangers, Houston, Texas. Pre-manufactured assembly with steel base and molded rubber roller such as Models 48-R-AH and 24-R-AH by Miro Industries, Inc.

H. Non-Penetrating Equipment Supports: Pre-manufactured supports constructed from 47mm by 47mm (1-7/8-inch by 1-7/8-inch) 12 gauge channel steel with rectangular support bases and steel angle supports. Provide threaded rod to connect supports such as "Type RTU-20" as manufactured by Portable Pipe Hangers, Houston, Texas.

I. Non-shrink Grout: Nonshrink, noncorrosive, grouting compound; CRD-C-621, Type D, such as "Sika Grout 212" by Sika, "Instant Grout" by Five Star Products, or approved equal.

J. Concrete Deck Repair Materials: Multi-component, polymer modified Portland cement mortar, trowel-grade such as: "SikaTop 122 Plus" by Sika, "Gel Patch" by BASF. or approved equal. Utilize aggregate for applications greater than 25mm (1-inch) thick that is clean, well graded aggregate with low absorption and high density of maximum size of 10mm (3/8-inch).

K. Splash Blocks: Pre-cast concrete; minimum size of 50mm (2-inches) thick by 450mm (18-inches) by 750mm (30-inches).

L. Isolator Pad: Panel composed of recycled rubber particles such as: "Roof Gard Pads" by Humane Manufacturing, L.L.C. or "Duo-Pad" by W. R. Meadows.

PART THREE - EXECUTION

3.01 EXAMINATION:

A. Examine existing building and existing roofing to determine existing physical conditions that affect removal of existing materials and installation of new materials.
B. Verify that required barricades and other protective measures are in place.

3.02 PREPARATION:

A. Take measures to maintain watertight conditions during term of Contract.
B. Install interior protection and dust partitions.
C. Protect adjacent surfaces.
D. Roof Drains:
E. Examine existing drain lines for debris or blockage.
F. Clean drains and drain lines, removing debris, excessive bitumen, or aggregate. Flush with water to ensure that drains flow freely.
G. Cap drains with drain plugs during daily operations.
H. Remove plugs after daily clean-up and prior to onset of rainfall.

3.03 MINOR DEMOLITION OPERATIONS:

A. Execute demolition in careful and orderly manner with least possible disturbance or damage to adjoining surfaces and structure.
B. Avoid excessive vibrations in demolition procedures that would be transmitted through existing structure and finish materials.
C. Roof Removal:
1. Remove existing deck coating, loose repairs, abandoned and obsolete equipment; and other such items; and sheet metal down to concrete roof deck to obtain a clean debris-free deck to receive new roofing materials.
2. Do not stockpile debris on roof surface. Promptly dispose of obsolete equipment and debris at authorized disposal site each day. Use chutes or appropriate equipment to transfer debris from roof surface to dumpsters.
3. Repair damage to the roof surface and exterior walls caused by Contractor's activities.

3.04 MINOR RENOVATION WORK:

A. Prepare substrates in accordance with manufacturer's recommendations.
B. Decking:
1. Concrete Decking:
a. Route and seal existing cracks.
b. Patch spalled areas and exposed rebar areas with concrete repair mortar. Remove loose and defective concrete. Apply rust inhibitor to exposed rebar. Trowel smooth the properly placed grout.
c. Cover holes or openings 300mm (12-inches) in diameter or smaller with a plate of 18 gauge sheet metal. Extend plate minimum 100mm (4-inches) beyond edge of hole and onto adjacent unaffected rib.
d. Build-up or in-fill low areas and trenches in concrete deck with deck repair mortar.
C. Plywood/Gypsum Sheathing:
1. Install new plywood and/or gypsum sheathing at walls, curbs, and perimeters, as required. Replace damaged, deteriorated, or non-salvageable plywood or gypsum sheathing.
2. Secure plywood or gypsum sheathing to substrate with flat head fasteners (type appropriate for substrate) spaced 300mm (12-inches) on-center.

3. Secure plywood or gypsum sheathing to wood substrate with nails spaced 150mm (6-inches) on-center.

D. Equipment Renovation:
   1. Remove, retain, and reinstall existing equipment as required to facilitate new flashing.
   2. Securely fasten equipment on concrete paver after new roofing is installed with steel straps anchored to concrete on each corner or side of equipment.

E. Rooftop Equipment:
   1. Move and elevate air conditioning units and other rooftop equipment as required to install roofing materials complete and in accordance with plans and specifications.
   2. When units or equipment are to be moved, disconnect and move to protected area to prevent damage to parts or components. Reset and reconnect at Contractor's expense.
   3. Disconnection and reconnection shall be performed by mechanical and/or electrical company licensed to perform such work and approved by Owner's Representative.
   4. Install equipment on top of concrete paver. Set equipment on top of concrete paver and anchor to paver.

F. Condensate Lines: Raise and reroute existing condensate lines and supports as required. Provide positive drainage of piping. Reinstall existing and install new condensate lines at existing or new units where discharge is directed onto roof. Route lines to discharge into nearest drainage medium (i.e. drain, gutter, etc.).

G. Piping and Conduit Modifications:
   1. Schedule piping and unit downtime for equipment modifications to coordinate with Owner's operations. Switchover time shall be limited to meet Owner's requirements.
   2. Replace existing supports for units and associated piping with new supports.
   3. Provide temporary supports to maintain unit and piping in operational condition except during switchover.
   4. Furnish new fittings, piping, and accessories to match existing to replace deteriorated, damaged, or non-functional components or to accommodate new unit elevation, where necessary.
   5. Provide auxiliary make-up air units to supply HVAC needs during equipment downtime, when required.

H. Piping Supports:
   1. Furnish and install new supports for piping (conduit, gas, water, condensate, etc.).
   2. Install supports at maximum spacing of 3m (10 feet) on-center and within 600mm (2 feet) of changes in plane or direction. Space supports for piping 250mm (10-inches) in diameter or larger and multiple pipes 2.4m (8 feet) on-center.
   3. Install over a layer of heavy-duty protection pad set on top of a layer of protection pad adhered to concrete paver surface.

I. Existing Roof Drains:
   1. Secure and modify drains to receive new roofing system.
   2. Verify drains and pipes are properly secured and sealed.
   3. Remove, replace, lower, or enlarge drains as required to accommodate new roofing system.
   4. Replace damaged, missing, or otherwise non-salvageable drain components with new components.
   5. Paint new strainers and clamp rings prior to installation.

J. Through-wall Scuppers:
   1. Enlarge existing scuppers to allow for installation of proper flashing and as designated on drawings.
   2. Demolition shall be performed by trained specialist equipped with proper tools for clean, plumb, and neat work to provide satisfactory opening to receive new roof scuppers.

3. Cutting shall take place at time and day pre-approved by Government's On-site Representative.
4. Cutting must take place in presence of Contractor's forces. In case of sudden unexpected rain, Contractor shall temporarily seal opening watertight.
5. Install scupper sleeves in accordance with manufacturer's code and instructions.
6. Upon completion of scupper drain installation, test scupper drains for leaks. Repair and retest until scupper drains do not leak.

K. Plumbing Vents:
1. Extend plumbing vents or modify as necessary to accommodate new roof installation.
2. Provide pipe extensions and no-hub couplings where necessary to achieve minimum 200mm (8-inch) height above top of newly finished roof surface.
3. Utilize same material type and size as existing for new extension.

L. Sheet Metal Fabrications:
1. Remove and replace ferrous rooftop sheet metal fabrications to match existing.
2. Modify existing sleeves and umbrellas on existing equipment as scheduled.
3. Repair and renovate non-ferrous rooftop and drainage system sheet metal fabrications as required for permanent watertight installation.
4. Paint sheet metal with metal primer.

M. Plaster Removal:
1. At locations indicated, carefully remove existing deteriorated, cracked or otherwise non-salvageable plaster.
2. Remove plaster utilizing appropriate power saws in order to achieve straight and true finish edge.
3. Install new plaster with color and texture to match existing.

N. Sealant Removal:
1. Cut out and remove existing sealants, joint backing, bond breaker tapes, mortar, and other loose materials to depths required by the sealant manufacturer, or to 13mm (1/2-inch) deep, minimum.
2. Remove foreign matter from joint substrates which could interfere with adhesion of joint sealant.
3. Remove debris from jobsite.

O. Satellite Dish:
1. Install and secure satellite dish on specified supports set on top of protection pads.
2. Coordinate with Government's On-site Representative regarding the moving, relocating, and proper positioning of equipment.

P. Doors and Thresholds:
1. Modify doors and thresholds to accommodate new flashing installation and to provide minimum 200mm (8-inch) flashing height.
2. Relocate low hinges as required.
3. Reinstall door and install new weatherstripping for permanent seal.

3.05 CLEANING:

A. Materials, equipment, and debris resulting from demolition operations shall become property of Contractor. Remove and dispose of demolition debris in accordance with applicable city, state, and federal laws at authorized disposal site.

B. Leave substrate clean and dry, ready to receive new materials.

3.06 WINDOW WASHING:

A. Wash exterior surfaces of windows affected by wet seal repairs and/or power washing and water repellent sealer application.

END OF SECTION 02072

SECTION 03610

EPOXY RESIN INJECTION

PART ONE - GENERAL

1.01 SECTION INCLUDES:

A. Furnishing all materials, tools, equipment, appliances, transportation, labor, and supervision required to repair specified cracks and joints by the injection of an epoxy resin.
B. Preparing existing substrates and installing surface seals.
C. Installing injection resin to completely fill cracks to be repaired.
D. Removing or dressing surface seal to a finished condition.

1.02 RELATED SECTIONS:

A. 03730 - Concrete Rehabilitation.
B. 09830 - Elastomeric Coating.

1.03 SUBMITTALS:

A. Provide submittals in accordance with Section 01300 - Submittals.
B. Submit for approval to Government, a complete written description of epoxy resin material, pressure injection system, and application methods to be used. Include equipment used in the process, calibration procedures, field pressure and ratio test procedures, and materials to be used. Do not commence work until Government's COR has reviewed the submittal.
C. Submit preliminary progress schedule indicating approximate start and completion dates and planned sequence for epoxy resin injection work. Address areas which will be closed or restricted from normal use, and the times the areas will be restricted.
D. Submit manufacturers' descriptive product data and literature, substrate preparation instructions, and application instructions for each product used.
E. Submit Material Safety Data Sheets (MSDS) for each product used.
F. Submit to Government a report of injection results for each injected crack. Include the following information: Date and time; Ratio equipment number; and Lot number of materials.

1.04 QUALITY ASSURANCE:

A. Single Source Responsibility: Provide epoxy resin material and surface seal material produced by same manufacturer.
B. Installer: Firm having not less than five years successful experience in comparable projects and employing personnel skilled in restoration processes and operations specified.

1.05 DELIVERY, STORAGE, AND HANDLING:

A. Deliver and store materials in accordance with Section 01500 - Temporary Facilities and Controls.
B. Deliver materials in original, new, unopened packages and containers bearing manufacturer's name and label, and following information:
    1. Manufacturer's name.
    2. Name or title of material.
    3. Federal Specification number, if applicable.
    4. Manufacturer's stock number, date of manufacture, and batch number.
    5. Application instructions.

C. Store materials not in actual use off the ground in tightly covered containers outside of building. Maintain containers used in storage of materials in a clean and dry condition, free of foreign materials and residue.
D. Protect from rain, freezing, or excessive heat until ready for use.
E. Remove damaged materials from site.

1.06 PROJECT CONDITIONS:

A. Do not apply epoxy surface seal or injection resin material when the temperature of surfaces to be repaired and the surrounding air temperatures are below 5 degrees Celsius (40 degrees Fahrenheit), unless otherwise permitted by manufacturer's printed instructions.
B. Do not apply epoxy surface seal or injection resin to damp or wet surfaces unless otherwise permitted by manufacturer's printed instructions.
C. Protect walls, flooring, and interior finishes to avoid damage due to mixing, application, and handling of epoxy materials.

PART TWO - MATERIALS AND EQUIPMENT

2.01 EPOXY INJECTION RESIN:

A. Two-component, low viscosity injection resin material which is moisture insensitive and solvent free typified by “Sikadur 35 Hi-Mod LV” manufactured by Sika Corporation, or approved equivalent with Minimum Compressive Strength: 13,000 pounds per square inch (psi) at 28 days; Minimum Tensile Strength: 8,900 psi at 7 days; Bond Strength, Hardened Concrete-to-Hardened Concrete: 2,900 psi; Shear Strength: 5,100 psi at 14 days; and Minimum Modulus of Elasticity: 4.1 X 10_5 psi at 14 days.

2.02 SURFACE SEAL:

A. Provide a surface seal material to confine the injection resin in the fissure during injection and cure, typified by “Sikadur 31, Hi-Mod Gel” by Sika Corp., or approved equivalent.
B. Provide a surface seal material which has adequate strength to secure injection ports firmly in place, resist injection pressures adequately to prevent leakage during injection, and be capable of application, adhesion, and curing when applied to wet surfaces.

2.03 EQUIPMENT FOR INJECTION:

A. Provide portable, positive displacement type pumps with interlock with provisions for positive ratio control of exact proportions of the two resin components at the nozzle to meter and mix the two resin components and inject the mixture into the crack. Provide electric or air powered pumps with provisions for in-line metering and mixing and a counter attached to the pump to measure the quantity of material discharged.
B. Provide injection equipment with automatic pressure control capable of discharging the resin mixture at any pre-set pressure up to 200 psi plus or minus 5 psi, and a manual pressure control override.
C. Provide injection equipment capable of maintaining the volume ratio for the injection resin prescribed by the material manufacturer within a tolerance of plus or minus 5 percent by volume at any discharge pressure up to 200 psi.
D. Provide injection equipment equipped with sensors on both the component A and B reservoirs that will automatically stop the machine when only one component is being pumped to the mixing head.

PART THREE - EXECUTION

3.01 PREPARATION:

A. Clean surfaces adjacent to cracks or other areas of application by grinding or other mechanical means to remove existing paint, waterproof coatings, dirt, dust, grease, oil, efflorescence, or other foreign matter detrimental to bond of epoxy injection surface seal system. Acids and corrosive materials are not permitted for cleaning.

B. Flush all cracks larger than 0.015-inches in width alternately with water and air (to create turbulence and aid in cleaning the cracks).

C. Provide entry ports along the crack at intervals not greater than the approximate crack depth, or 150mm (6-inches) maximum if approved by Government. Spacing is determined by the tightness of the crack to permit travel of injected epoxy resin between ports and to fill cracks completely. Recess drilled ports, if required by injection resin manufacturer, a minimum of 13mm (1/2-inch).

D. Apply surface seal material to the face of the crack between the entry ports. Install ports and apply surface seal material on both sides of a concrete element, when both sides of the element are accessible. Stagger the port locations for through cracks.

E. Surface seal material must gain adequate strength before proceeding with the injection.

3.02 EPOXY RESIN INJECTION:

A. Temperature of concrete substrate must be above 4 degrees Celsius (40 degrees Fahrenheit).

B. Begin injection of epoxy resin at lowest entry port or at one end of the crack, and continue until flow of epoxy resin is observed at the next closest port. Pumping must continue under constant pressure until clear resin flows out of the next port with no milky residue indicative of the presence of moisture.

C. When epoxy resin travel is verified by flow from the adjacent port, discontinue injection at the entry port and transfer injection to the port from which the epoxy resin flowed.

D. Perform epoxy resin injection continuously until cracks are completely filled.

E. Terminate the Work and notify Government's On-site Representative if port-to-port travel of epoxy resin is not obvious.

F. Maintain injection pressure as low as practical. Notify Government's On-site Representative if injection pressures exceed 100 psi.

3.03 FINISHING:

A. When cracks are completely filled, cure the epoxy resin for sufficient time to allow removal of surface seal without any loss of epoxy material from the cracks.

B. Remove all drips, stains, or spills caused by surface seal materials and epoxy resin from concrete surfaces.

C. Grind or finish the face of the crack flush with adjacent concrete so that no indentations or protrusions caused by the placement of entry ports or surface seal are visible.

3.04 FIELD QUALITY CONTROL:

A. Pressure Test Method and Frequency:

1. Disconnect the mixing head of injection equipment and attach the two epoxy resin component delivery lines to the pressure check device. Provide a pressure check device consisting of two independent valved nozzles capable of controlling flow rate and pressure by opening or closing the valve. Provide a pressure gauge behind each valve. Close the valves on the pressure check device and operate equipment until the gauge pressure on each line reads 160 psi. Stop the pumps and confirm the gauge pressure does not drop below 150 psi within three minutes.
2. Conduct a pressure test for each injection unit at least once every four hours and no less than twice each work day, or at the direction of the Government's COR.

B. Ratio Test Method and Frequency:

1. Disconnect the mixing head of the injection equipment and simultaneously pump the two epoxy resin components through the ratio check device. Provide a ratio check device consisting of two independent valved nozzles capable of controlling back pressure by opening or closing the valve. Provide a pressure gauge capable of measuring the back-pressure behind each valve. Adjust discharge pressure to 160 psi for both epoxy resin components. Simultaneously discharge both epoxy resin components into separate calibrated containers. Compare the amounts simultaneously discharged into the calibrated containers to determine that volume discharged conforms to manufacturer's recommended ratio for the material.
2. Conduct a ratio test for each injection unit at least once every four hours and no less than twice each work day, or at the direction of Government's COR.

C. Obtain samples of the injection epoxy resin before beginning each shift and at hourly intervals during injection work by depositing the mix material from the injection nozzle into a small container to observe appearance and time of set. Suspend injection work until corrective measures are taken and notify Government's COR if the samples exhibit any evidence of improper proportioning, mixing, or material defects.

D. Government's COR, at any time without prior notification to Contractor, may be present to observe the injection procedure and document Work is in accordance with these Specifications.

END OF SECTION 03610

SECTION 03730

CONCRETE REHABILITATION

PART ONE - GENERAL

1.01 SECTION INCLUDES:

A. Furnishing all materials, tools, equipment, labor, and supervision to perform preparation and concrete rehabilitation as specified herein, and as required for a complete and proper installation.
B. Reconstructing or repairing spalled concrete and corrosion of reinforcing steel.
C. Providing for the structural integrity and performance of the concrete repair, while maintaining the overall aesthetics of the facility.

1.02 RELATED SECTIONS:

A. 02072 - Minor Demolition and Renovation Work.
B. 03750 - Corrosion Inhibiting Coating.
C. 07180 - Water Repellent Sealers.
D. 07920 - Joint Sealants.

1.03 SUBMITTALS:

A. Provide Submittals in accordance with Section 01300 - Submittals.
B. Product Data: Submit manufacturer's technical data for each product, including recommendations for product application and use.
C. Submit manufacturer's written Material Safety Data Sheet (MSDS) for each material used in this Section.
D. Submit architectural concrete repair material samples demonstrating aggregate profile, size, color, appearance, texture, and surface finish of completed architectural concrete repair.
E. Prepare on-site, in-place samples or mock-ups, depicting repaired architectural concrete.

1.04 WARRANTY AND GUARANTEE:

A. Provide written materials guarantee for the longest period available, agreeing to repair or replace materials which fail to perform or appear to deteriorate in any manner not clearly specified as an inherent quality of the material according to the manufacturer's published data.
B. Provide two-year Contractor's warranty for labor and materials repaired or installed.

1.05 QUALITY ASSURANCE:

A. Installation Qualifications: Work must be performed by a firm having not less than five years successful experience in comparable concrete restoration projects and employing personnel skilled in comparable restoration processes and operations.

PART TWO - PRODUCTS

2.01 CONCRETE REPAIR MATERIAL:

A. Horizontal Surfaces: Portland cement mortar, trowel grade, typified by:
   1. “SikaTop 122 Plus” by Sika.
   2. “Gel Patch” by BASF.
   3. Approved equal.

4. Aggregate for Applications Greater Than 25mm (1-inch) in Depth: Clean, well-graded aggregate with low absorption and high density. Provide aggregate in a saturated surface dry condition with a maximum size less than 3/8-inch. Maximum addition rate is 25 to 42 pounds per bag, as recommended by the mortar manufacturer.

B. Vertical and Overhead Surfaces: Polymer modified Portland cement mortar, non-sag, typified by
   1. “SikaTop 123 Plus” by Sika.
   2. “Gel Patch” by BASF.
   3. Or approved equivalent.
   4. Aggregate for Applications Greater Than 25mm (1-inch) in Depth: Clean, well-graded aggregate with low absorption and high density. Provide aggregate in a saturated surface dry condition with a maximum size less than 3/8-inch. Maximum addition rate is 35 pounds per bag or as recommended by the mortar manufacturer.

2.02 ARCHITECTURAL CONCRETE REPAIR MATERIAL, ROUGH SAWN WOOD SURFACE FINISH:

A. Single-component silica fume enhanced, polymer-modified Portland cement mortar, typified by:
   1. “MonoTop 611” by Sika.
   2. “Emaco 566 CI” by BASF.
   3. Or approved equal.

2.03 REINFORCING STEEL COATING:

A. Multi-component, polymer modified cementitious coating, typified by:
   1. “Armatec 110” by Sika
   2. “Emaco P24” by BASF.
   3. Or approved equivalent.

2.04 DOWELS:

A. Dowels: Stainless steel dowels, type 304, 6mm (1/4-inch) diameter, or as shown on the Drawings. Furnish hooks as shown on the Drawings.

2.05 FORMWORK:

A. Formwork: Provide molds, forms, and, where required, form-facing materials of metal, plastic, wood, or acceptable material that is non-reactive with concrete and will produce required finish surfaces on exposed surfaces.

2.06 WATER:

A. Water: Clean, potable, free of oil, acid, alkali, and organic matter.

2.07 EPOXY ADHESIVE:

A. Epoxy adhesive: Two component epoxy resin adhesive, for dowel installation, typified by:
   1. “Sikadur 32”, by Sika.
   2. “Concresive 1420” by BASF.
   3. Or approved equivalent.

PART THREE - EXECUTION

3.01 PREPARATION:

A. Report in writing to the Government's On-site Representative, any conditions or surfaces which may adversely affect the installation. Do not proceed with Work until

unsatisfactory conditions are corrected. Commencement of work implies acceptance of substrate and environmental conditions.

B. Use mechanical means to break out and remove all deteriorated, loose, or spalled material.
C. Chip remaining intact concrete in repair area until sound, clean concrete substrate is obtained. Remove loose concrete and dust with water or air under pressure.
D. Provide surfaces to be repaired free of defects and all laitance, dirt, dust, grease, efflorescence, paint, or other foreign material, with a minimum surface roughness profile of 2mm (1/16-inch).
E. Sawcut or undercut edges of spalled areas as necessary to eliminate feather edges and to provide a keyed patch.
F. Undercut exposed steel reinforcing if present. Provide clearance between reinforcing bars and adjacent concrete equal to one bar diameter up to a maximum of 18mm (3/4-inch) or 13mm (1/2-inch) minimum. Provide 13mm (1/2-inch) minimum clearance between welded wire fabric and adjacent concrete.
G. If corroded steel reinforcing extends beyond repair area, chip out adjacent concrete until uncorroded steel is uncovered. Use special care to prevent loss of bond to steel in remaining sound concrete.
H. Mechanically clean exposed steel reinforcing by means of power tool equipment, chipping or sandblasting to remove corrosion products.
I. Perform high pressure water blasting on prepared, cleaned reinforcing steel.

3.02 APPLICATION OF REINFORCING STEEL COATING:

A. Mix coating material in accordance with manufacturer's written instructions.
B. Provide adjacent concrete surfaces in a saturated surface dry condition with no standing water.
C. Brush apply coating material 10 to 20 mils thick to all surfaces of clean, exposed reinforcing steel. Overlapping onto the concrete surface is expected.
D. Allow coating to dry approximately two to six hours, and apply second 10 to 20 mil coat to reinforcing steel.
E. Brush apply 20-mil coating to prepared concrete substrate where (non-architectural) repair mortar is to be applied, as recommended by the repair mortar manufacturer.
F. Do not apply protective coating when ambient and surface temperatures are less than 4 degrees Celsius (40 degrees Fahrenheit), or greater than 29 degrees Celsius (85 degrees Fahrenheit).
G. Allow coating to dry in accordance with manufacturer's written instructions prior to applying repair material.

3.03 DOWEL INSTALLATION:

A. Install dowels in concrete repair areas where depth of concrete repair is 75mm (3-inches) or greater.
B. Prepare concrete surface adjacent to the repair area.
C. Pre-drill dowel holes in substrate.
D. Install new steel dowels with epoxy adhesive. Provide hook on dowel.

3.04 APPLICATION OF CONCRETE REPAIR MATERIAL:

A. Mix concrete repair material in accordance with manufacturer's written instructions.
B. Saturate clean substrate to receive repair material. Provide a surface in a saturated surface dry condition. Remove all standing water.
C. Apply mortar to substrate with a stiff brush, filling all voids and pores, forcing material against substrate surface.
D. Trowel apply repair material in successive lifts in accordance with manufacturer's written instructions. Score intermediate lifts and allow repair material to reach final set before applying successive lift (approximately thirty minutes). Saturate surface with water (as

recommended by the repair mortar material manufacturer, removing any standing water) and brush (scrub) on new mortar onto substrate surface. Repeat process until flush with surface.

E. Screed off and trowel repair to level or to match existing lines. Use soft sponge to float surface if required.
F. Keep repairs damp for thirty minutes after installation to complete curing if required by the manufacturer. Protect repair from rapid drying due to high heat or wind.
G. After material has hardened, place wet burlap bags or construction paper over repaired area.
H. Do not apply material in direct heat of sun, frost-filled substrates, or when the ambient and surface temperatures are less than 7 degrees Celsius (45 degrees Fahrenheit).

3.05 ARCHITECTURAL CONCRETE INSTALLATION:

A. Mix concrete repair material in accordance with manufacturer's written instructions.
B. Ensure depth of repair is 13mm (1/2-inch) or greater.
C. Provide concrete surfaces in a saturated surface dry condition with no standing water.
D. Apply reinforcing steel coating to prepared reinforcing steel and concrete substrate immediately prior to placing new concrete repair material.
E. Construct forms around repair areas to prevent the loss of concrete repair materials.
F. Pump or place concrete repair material into prepared form while coating is still wet and within 30 minutes of mixing.
G. Completely fill forms with concrete repair material. Vibrate form while placing material to achieve material flow and compaction, and to avoid entrapped air.
H. Remove forms after concrete repair material has achieved final set.
I. Trim or shape concrete repair material to desired profile.
J. Brush wash and/or perform light grit sandblasting of repair area to provide finished appearance of repair area to match adjacent concrete.
K. Cure repair material in accordance with material manufacturer's written instructions.

END OF SECTION 03730

SECTION 03750

CORROSION INHIBITING COATING

PART ONE - GENERAL

1.01 SECTION INCLUDES:

A. Cleaning existing exposed concrete surfaces.
B. Application of a penetrating corrosion-inhibiting coating to exposed concrete surfaces.

1.02 RELATED SECTIONS:

A. 02072 - Minor Demolition and Renovation Work.
B. 03730 - Concrete Rehabilitation.
C. 07180 - Water Repellent Sealer.
D. 07920 - Joint Sealants.

1.03 SUBMITTALS:

A. Provide submittals in accordance with Section 01300 – Submittals.
B. Product Data: Submit manufacturer's technical information, including label analysis, application instructions, and MSDS for each material proposed for use. Do not proceed with test application or with work until technical information is approved by Government's On-site Representative.
C. Test areas will be selected by Government's On-site Representative.
D. Clean and otherwise prepare test areas as necessary, a minimum of 1.2m by 1.2m (4-feet by 4-feet) in dimension, depicting cleaned concrete surface, repairs, and application of corrosion inhibiting coating for the inspection and approval of Owner's Representative.
E. Conduct testing on each surface exposure in unobtrusive locations on representative surface conditions employing the proposed surface preparation and application procedures.
F. Test adjacent surfaces not to be treated for possible detrimental effect or aesthetic alteration created by exposure to the specified surface treatment and protect as deemed necessary.
G. Test procedures include evaluation of proposed protection and ventilation techniques and equipment associated with the application of specified corrosion inhibiting coating.
H. Apply tests using the same equipment and application procedures as proposed for overall application. Allow test applications to dry for a minimum of three days prior to inspection and approval. Test areas will remain available for inspection by Owner's Representative throughout the job application.
I. Test application will verify compatibility of the specified surface treatment with the concrete substrate surfaces.
J. Owner's Representative will approve all test areas and application procedures prior to the start of full scale treatment operations.

1.05 QUALITY ASSURANCE:

A. Manufacturer Qualifications: Manufacturers supplying products shall have been regularly engaged and specializing for the preceding ten years in the formulation, manufacture, and distribution of corrosion inhibiting coating product for buildings.
B. Performance Requirements: Provide corrosion inhibiting coatings that have been produced and installed to treat concrete substrate.
C. Installation Qualifications: Work must be performed by a firm having not less than five years successful experience in comparable application procedures and employing personnel skilled in application of corrosion inhibiting coatings. Contractor shall possess all necessary certifications, licenses, and other written approvals as required by the

manufacturer and as necessary for the execution of the work specified. Contractor shall maintain personnel on site who have received product training by the product manufacturer.

D. Manufacturer shall be capable of on-site testing for the presence of the corrosion inhibitor at the specified depth.

1.06 DELIVERY, STORAGE, AND HANDLING:

A. Deliver materials to site in manufacturer's original unopened containers and packaging, bearing labels including manufacturer's name, product name, type of material, batch number, date of manufacture, shelf life, and instructions for use.

B. Government's On-site Representative reserves the right to inspect containers prior to their being opened, to review the accompanying bills of lading, and to reject materials in opened containers.

C. Protect corrosion inhibiting coating materials during storage and construction from wetting by rain, snow, or ground water and from staining or intermixture with earth or other types of materials.

D. Protect materials from deterioration by moisture and temperature. Store in dry location or in waterproof containers. Keep containers tightly closed and away from open flames. Protect liquid components from freezing. Comply with manufacturer's recommendations for minimum and maximum temperature requirements for storage.

E. Remove damaged, deteriorated, or out-of-date materials from site.

1.07 PROJECT CONDITIONS:

A. Protect persons, motor vehicles, glass, roof surfaces, landscaping, vegetation, adjacent surfaces, building site, and surrounding buildings from injury resulting from spillage, overspray, contamination, soiling, and damage resulting from corrosion inhibiting coating application.

B. Coordinate with Owner to protect ventilation systems in the building during the coating application.

C. Prevent chemical solutions from coming into contact with pedestrians, motor vehicles, landscaping, buildings, interior finishes, and other surfaces which could be damaged by contact.

D. Do not clean concrete surfaces or apply coating during winds of sufficient force to spread products to unprotected surfaces.

E. Erect temporary protection covers over pedestrian walkways and at points of entrance and exit for persons and vehicles which must remain in operation during course of concrete cleaning and coating application.

F. Surfaces to receive coating application should be in a dry condition.

G. Apply coating to concrete surfaces only when ambient air and surface temperatures are greater than or equal to 4 degrees Celsius (40 degrees Fahrenheit), or less than or equal to 35 degrees Celsius (95 degrees Fahrenheit), and will remain so at least forty-eight hours after application.

H. Do not apply coating within 48 hours of anticipated rain.

I. Dispose of runoff from cleaning and coating operations by legal means an in manner to prevent accumulation of material on adjacent horizontal decks, soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

1.08 SEQUENCING AND SCHEDULING:

A. Perform Work in Following Sequence:

1. Schedule work starting at the base of the building and working to top.
2. Install protective covers to protect glass, landscaping, entrances, and dissimilar materials.

3. Complete all cleaning, restoration, concrete repair, and sealant installation in the designated area prior to coating application.
4. Clean glass windows after application of coating and water repellent sealer.

1.09 WARRANTY:

A. Manufacturer's Warranty: Provide manufacturer's longest available warranty for coating material.
B. Contractor's Warranty: Provide written warranty against defects in material and workmanship for a period of two years from date of substantial completion.

PART TWO - PRODUCTS

2.01 CORROSION INHIBITING COATING:

A. Acceptable Products:
   1. “FerroGard 903”, Sika Corporation.
   2. “Protectosil CIT”, Evonik Industries.
   3. “Duralprep 3020”, The Euclid Chemical Company.
   4. “Masterseal CP”, BASF Construction Chemicals.
   5. Or approved equal.

2.02 CLEANING MATERIALS AND EQUIPMENT:

A. Water for Cleaning: Clean, potable, free of oils, acids, alkalis, salts, and organic matter.
B. Warm Water: Heat water to temperature of 60 degrees to 82 degrees Celsius (140 degrees to 180 degrees Fahrenheit).
C. Brushes: Fiber bristle only.
D. Cleaning Products:
   1. “Sertec”, Sermac, a Division of Service Master Industries, Inc.
   2. “Sure Klean Light Duty Restoration Cleaner”, ProSoCo, Inc.
   3. Or approved equal.

PART THREE - EXECUTION

3.01 PRECAUTIONS:

A. Provide adequate ventilation to prevent build up of fumes.
B. Applicators shall wear cartridge type respirators approved for fumes by the coatings manufacturer, safety goggles, and chemical resistant gloves.
C. Shut down and cover air conditioning intakes and air handling equipment in the vicinity of the application to prevent fumes and odors being drawn into the building. Obtain Owner approval before shutting down air conditioning and ventilation equipment.

3.02 PREPARATION:

A. Clean all surfaces to be treated free of dust, surface dirt, oil, grease, rust stains, efflorescence, biological growth, and other surface contaminants.
B. Protect all surrounding and adjacent surfaces not to be treated from contact with the specified treatment.
C. Protect adjoining glass, rubber gaskets, metal, painted surfaces, and roof surfaces from overspray and spillage. Immediately remove inadvertent spillage using water, mineral spirits, or as recommended by the coating manufacturer.
D. Install all sealant, concrete, patching, crack, and joint repair prior to application of the coating, as recommended by the material manufacturer.

E. Inspect all surfaces to verify that they are dry and properly prepared to receive the specified surface treatment. Do not proceed with application until all unsatisfactory conditions have been corrected.

3.03 CLEANING EXISTING CONCRETE:

A. Clean concrete in preparation for application of corrosion inhibiting coating.
B. Determine method of cleaning based upon adjoining materials, site conditions, and manufacturer's requirements.
C. Use water blasting or hand method to clean substrate and open pores.
D. Verify surfaces to be restored are clean, free of coatings, efflorescence, stains, mildew, mold, biological growth, grime, dirt, tar, oil, grease, or other foreign matter and discoloration detrimental to application.
E. Cleaning:
    1. Proceed with cleaning in an orderly manner; work from top to bottom and from one end of each elevation to the other.
    2. Determine method of cleaning based upon adjoining materials, site conditions, and manufacturer's requirements.
    3. Use water blasting or hand method which will clean substrate and open pores.
    4. Perform each cleaning method indicated in a manner which results in uniform coverage of all surfaces, including corners, moldings, interstices and which produces an even effect without streaking or damage to concrete surfaces.
    5. Rinse off chemical residue and soil by working upwards from bottom to top of each treated area.
F. Water Cleaning Methods:
    1. Spray Applications: Spray-apply water to concrete surfaces to comply with requirements indicated for location, purpose, water temperature, pressure, volume, and equipment. Unless otherwise indicated, hold spray nozzle not less than 6-inches from surface of concrete and apply water from side to side in overlapping bands to produce uniform coverage and an even effect.
    2. Low Pressure Spray: 100 to 400 psi; three to six gallons per minute.
    3. Medium Pressure Spray: 400 to 800 psi; three to six gallons per minute.
    4. High Pressure Spray: 800 to 1200 psi; three to six gallons per minute.
    5. Steam Wash: Apply steam to concrete surfaces at pressures not exceeding 80 psi. Hold nozzle no less than 150mm (6-inches) from surface of concrete and apply steam from side to side or in direction of tooling in overlapping bands to produce uniform coverage and an even effect.
G. Chemical Cleaner Application Method:
    1. Apply chemical cleaners to concrete surfaces to comply with chemical manufacturer's recommendations using brush or spray application methods, at Contractor's option, unless otherwise indicated. Do not allow chemicals to remain on surface for periods longer than that indicated or recommended by manufacturer.
    2. Spray Application: Apply to pressures not exceeding 50 psi, unless otherwise indicated.
    3. Reapplication of Chemical Cleaners: Do not apply chemical cleaners to same concrete surfaces more than twice. If additional cleaning is required, use steam wash.

3.04 APPLICATION:

A. Comply with instructions, procedures, and recommendations of coating manufacturer established at the pre-installation job meeting and as tested and approved.
B. Apply coating as packaged, without dilution or alteration. Mix or prepare the material in strict accordance with manufacturer's recommended procedures.

C. Application may be by low pressure (20 psi) airless sprayer, garden sprayer, or saturated brush or roller as recommended by manufacturer. Spray equipment must be fitted with solvent resistant gaskets and hoses.
D. Apply coating in two coats. Thoroughly saturate the treated surface without rundown or flooding at rates recommended by manufacturer (200 square feet per gallon, each coat) or approved by prior testing.
E. Allow first coat to dry approximately two to eight hours before applying second coat, as recommended by the material manufacturer.
F. Application to Horizontal Surfaces: Thoroughly broom surface residues, pools, and puddles until complete penetration with no residue is achieved.
G. Application to Vertical Surfaces: When spraying, use a uniform horizontal stroke followed by a uniform overlapping vertical stoke.
H. Apply coating from the bottom of the work area to the top, allowing rundown only as recommended by the manufacturer for the specified product.
I. Apply additional coats of material as required by the manufacturer.
J. Protect treated area from rain or frost for a minimum of twenty-four hours after application of the coating.

3.05 CLEANING:

A. Clean surfaces to receive subsequent application of elastomeric coating, repair mortar, etc., a minimum of eight hours after application of the corrosion inhibiting coating to remove any corrosion inhibiting coating residue.
B. Immediately clean surfaces not scheduled to receive treatment according to manufacturer's recommendations.
C. Remove all masking, protective sheeting, equipment, and materials.
D. Clean all surrounding and adjacent surfaces of tape and masking residues.
E. Dispose of all waste products, empty containers, and trash off site in a legally approved manner.
F. Clean equipment and tools with water or solvents recommended by manufacturer.

END OF SECTION 03750

SECTION 07220

ROOF AND DECK INSULATION

PART ONE - GENERAL

1.01 SECTION INCLUDES:

A. Loose laid installation of cementitious faced composite insulation board.
B. Installation of drain board.

1.02 RELATED SECTIONS:

A. 02072 - Minor Demolition and Renovation Work.
B. 07533 - Thermoplastic Single-ply Roof System.

1.03 REFERENCES:

A. American Society for Testing and Materials (ASTM).
B. Standards:
    1. FM Global Approval Guide.
    2. Underwriters Laboratories: Building Materials Directory.
    3. National Roofing Contractors Association (NRCA): The NRCA Roofing and Waterproofing Manual, latest Edition.

1.04 SUBMITTALS:

A. Product Data:
    1. Data sheets for each component required, including concrete panel laminated to insulation boards, fasteners, adhesives, and associated materials.
    2. Roofing system manufacturer's written acceptance of proposed concrete panel laminated to insulation, fastening system, and procedures for the installation.

1.05 QUALITY ASSURANCE:

A. Regulatory Requirements:
    1. Classified by Underwriters Laboratories Inc. as Class A rated material.
    2. Follow local, state, and federal regulations, safety standards, and codes. When conflict exists, the more restrictive document shall govern.

B. Installation:
    1. Install in accordance with manufacturer's current published application procedures and general requirements of NRCA.
    2. Consider roof system manufacturer's technical specifications part of this Specification and use as reference for specific application procedures.
    3. Install system in accordance with SPRI guidelines.

1.06 DELIVERY, STORAGE, AND HANDLING:

A. Store materials in accordance with manufacturer's recommendations.
B. Outdoor Storage:
    1. Protect cementitious faced insulation board from damage.
    2. Secure insulation to resist high winds.
    3. Distribute insulation stored on roof deck to prevent concentrated loads that would impose excessive stress or strain on deck or structural members.
    4. Handle with care as per the manufacturer's instructions.

1.07 SEQUENCING AND SCHEDULING:

A. Plan roof layout with respect to roof deck slope to prevent rainwater drainage into completed roofing.

B. Do not install more insulation than can be made watertight in same day.

1.08 PROJECT CONDITIONS:

A. Environmental Recommendations:
   1. Apply roofing and insulation in dry weather.
   2. Do not proceed with roof construction during inclement weather or when precipitation is predicted with 30 percent or more possibility.
   3. Do not apply insulation over wet or moist deck or in foggy conditions.
   4. Consider days when wind speeds are 30 mph or greater as "bad weather" days.

B. Maintain on site equipment and material necessary to apply emergency temporary seals in event of sudden precipitation. Costs for emergency roofing shall be paid by Contractor.

PART TWO - PRODUCTS

2.01 ROOF INSULATION:

A. Composite Insulation Board: Extruded polystyrene foam board, 50mm (2-inch) thick, 0.6m by 1.2m (2 feet by 4 feet) size board with 9mm (3/8-inch) latex-modified concrete laminated surfacing, such as "LightGuard" by TClear Corp. (800/544-7398).

2.02 RELATED MATERIALS:

A. Prefabricated Drainage Course: A composite drainage system consisting of a three-dimensional, crush-proof drainage polystyrene core and a non-woven filter polypropylene fabric on the dimple side of the core, and a polymeric sheet adhered to the back of the core, 732 kN/m_2 compressive strength, such as "J-Drain 720" by JDR Enterprises, Inc., or "Amerdrain 520" by American Wick Drain Corporation.

B. Compressible Fill Insulation: Foil or paper faced compressible fiberglass batten roll insulation of proper size and thickness to insert at openings at penetrations, perimeters, and curbs such as manufactured by Owens Corning.

PART THREE - EXECUTION

3.01 GENERAL:

A. Follow local, state, and federal regulations, safety standards, and codes. When a conflict exists, the more restrictive document shall govern.

B. Roof system manufacturer's technical specifications shall be considered a part of this Specification and should be used as a reference for specific application procedures.

3.02 EXAMINATION:

A. Roofing contractor shall examine the roof deck and related substrates and verify that there are no conditions that would prevent the roof system manufacturer's approval of the application of the roof system. These conditions include, but are not limited to, the following:
   1. Inadequate anchorage of decking or substrates to structure.
   2. Accumulations of moisture.
   3. Tears, holes, cracks, or punctures.
   4. Ridges, uneven conditions, or gaps.
   5. Rust or other forms of deterioration.
   6. Presence of foreign materials.

3.03 PREPARATION:

A. In order to meet the roof system manufacturer's requirements and to ensure that deck conditions will not restrict roof drainage, do not install insulation until all defects in roof and deck substrates are corrected, including building up low areas of the deck.
B. Refer to Section 02072 - Minor Demolition and Renovation Work for removal of existing roofing, insulation, and flashings.

3.04 APPLICATION:

A. Prefabricated Drainage Board Placement:
    1. Install drainage course in accordance with the manufacturer's recommendations.
    2. Prior to installation of drainage board, install slip sheet if drainage board does not have integral protective film on bottom surface. Loose lay slip sheet over membrane lapping adjacent sheets a minimum of 150mm (6-inches).
    3. Layout and position drainage course and allow to lay flat. Cut and fit drainage course along walls, curbs, and around penetrations.
    4. Connect adjacent panels at the longitudinal edge by pulling the filter fabric back to expose the flange. Place the flangeless panel edge on top of the flange of the adjacent panel and butt dimple to dimple.
    5. Expose two rows of dimpled core by pulling the filter fabric back at panel end. Place the end of the next two panels over the two rows of dimples and interlock.
    6. Complete connections in shingle fashion from top to bottom so that moisture will flow with the overlap and not against it.
    7. Overlap fabric in the direction of water flow. Secure terminal edges with the filter fabric flap by tucking behind the core.
    8. Wrap exposed edges of drainage course material with filter fabric.
    9. Place subsequent topping materials as soon as possible or provide temporary ballast until final overburden is placed.

B. Composite Insulation:
    1. Over the drainage board, loose lay cementitious surfaced boards in accordance with manufacturer's installation requirements.
    2. Fit all boards tightly, allowing no more than 6mm (1/4-inch) gap between boards. Insulation boards should be cut with masonry saw and placed as necessary.
    3. Install boards with long dimension in direction of roof slope.
    4. Stagger transverse joints of adjacent boards a minimum of 600mm (24-inches).
    5. Bevel cut insulation boards where necessary to conform to slope of roof.
    6. Secure boards located along perimeters of roof areas and around penetrations utilizing metal straps and retaining devices. Secure retaining devices into cementitious surface using appropriate fasteners spaced 300mm (12-inches) on-center. Locate fasteners a minimum of 75mm (3-inches) from edge of board.

3.05 CLEANING:

A. Remove debris and material wrappers from roof to dumpster daily. Leave insulation clean, dry, and ready to receive new roofing.

END OF SECTION 07220

SECTION 07533

THERMOPLASTIC SINGLE-PLY ROOF SYSTEM

PART ONE - GENERAL

1.01 SECTION INCLUDES:

A. New and loose-laid reinforced fleece-backed thermoplastic single-ply roofing system.
B. Related membrane flashings and other accessories.

1.02 RELATED SECTIONS:

A. 02072 - Minor Demolition and Renovation Work.
B. 07220 - Roof and Deck Insulation.
C. 07620 - Sheet Metal Flashing and Trim.

1.03 REFERENCES:

A. American Society for Testing and Materials (ASTM).

1.04 QUALITY ASSURANCE:

A. Applicator:
   1. Approved by manufacturer of accepted roofing system.
   2. A single applicator with a minimum of five years previous successful experience in installations of similar systems.
   3. Minimum five years experience in single-ply roofing with two years experience seaming system same as one currently being bid.
   4. Be present at job site at all times when work is being performed. Supervise workers as required to ascertain workmanship, progress, and adherence to details.
   5. Report to Owner's Representative daily.
   6. Be responsible for schedule and coordination.
   7. Have authority to make binding commitments upon Contractor in the field.

B. Regulatory Requirements:
   1. Classified by Underwriters' Laboratories, Inc. as a UL 790 Class A roof covering.
   2. U.S. Federal regulations, safety standards, and codes.

C. Ballast or attach ALL roofing system materials (including roof insulation, roofing membrane, flashing, and other materials) as required to resist all wind uplift, wind lateral loading, and other wind force conditions. At a minimum, comply with the more stringent of the following standards and requirements:
   1. All applicable codes, ordinances, and regulations, including ASCE-7 and SPRI.
   2. Underwriters Laboratories UL-580 Class 90 Wind Uplift Resistance Classification.
   3. The best standards of good practice.

D. Submit proposed fastening details and product data for all conditions. Submit a Certificate stating that all roofing system construction complies with all applicable standards and requirements as required herein.

1.05 DELIVERY, STORAGE, AND HANDLING:

A. Deliver materials in manufacturer's original, unopened containers or packages with labels intact and legible.
B. Store materials in accordance with manufacturer's recommendations. Store rolled goods on clean raised platforms. Store other materials in dry area, protected from water and direct sunlight, and maintain at a temperature of 15 to 27 degrees Celsius (60 to 80 degrees Fahrenheit).
C. Deliver materials in sufficient quantities to allow continuity of work without delay.

D. Store materials in weather protected environment, clear of ground, and free from moisture. Protect materials against damage. Keep all materials used in construction of the roofing free from moisture prior to and during application. Do not store in plastic bags which may create condensation within bags.
E. Store cementitious roof insulation and drainage mat on pallets or dunnage at least 100mm (4-inches) above the ground, roof, or deck and protect as necessary to keep dry.
F. Handle all materials so as to prevent damage to roofing system components and completed roof system.
G. Proper storage of materials is the sole responsibility of Contractor. Protect all materials susceptible to moisture including, but not limited to, all roll goods, insulation, cant strip, wood, and plywood in dry, above ground, watertight storage. Keep labels intact and legible, clearly showing the product, manufacturer, and other pertinent information.
H. Any materials becoming wet or damaged will be rejected and shall be removed from job site immediately. Any insulation found to be improperly stored at jobsite shall be considered wet at the discretion of Owner's Representative and removed from jobsite.
I. Maintain products liable to degrade as a result of being frozen above 4 degrees Celsius (40 degrees Fahrenheit) in heated storage.

1.06 PROJECT CONDITIONS:

A. Existing Conditions: Examine existing building and existing roofing to determine existing physical conditions that affect preparation of existing roofing and installation of new roofing.
B. Environmental Requirements:
    1. Apply roofing in dry weather.
    2. Do not remove existing roofing and flashing in inclement weather or when rain is predicted (30 percent or more possibility).
    3. When ambient temperature is below 16 degrees Celsius (60 degrees Fahrenheit), expose only enough sensitive cements, sealants, and adhesives as required within a four hour period.
    4. Do not expose membrane and accessories to a constant temperature in excess of 82 degrees Celsius (180 degrees Fahrenheit).
C. Protection:
    1. Provide special protection and avoid traffic on completed areas of membrane installation.
    2. Restore to original condition or replace work or materials damaged during handling of roof materials.
    3. Take precautions as required to protect adjacent work and structures.
D. Emergency Equipment: Maintain on site equipment necessary to apply emergency temporary edge seal in event of sudden storms or inclement weather.
E. Restrictions:
    1. Comply with requirements of Section 01010 - Summary of Work on use of site.
    2. Smoking is prohibited on roof areas or in existing buildings.
    3. Maintain facility and all utility services in a functional condition for Owner's utilization.

1.07 SEQUENCING/SCHEDULING:

A. Install new roof membrane system immediately after completion of preparation and building up of low areas have properly cured/aged.
B. Schedule work as required to prevent traffic and material handling over completed work.
C. Notify Owner's Representative at least two hours prior to installing temporary water cut off edge seal at end of day's work.

1.08 WARRANTY:

A. Contractor: Provide Owner a written warranty for a period of two years after Owner's final acceptance covering all repairs required to correct all defects due to faulty materials

or workmanship and to otherwise maintain the roof in a watertight condition and to correct all other defects without regard to watertightness. Make repairs promptly on notification and at no expense to Owner.

B. Roof System Manufacturer: Manufacturer of the single-ply membrane roof system shall furnish a written warranty and guarantee that warrants and guarantees Owner with a watertight condition of roof system and all components thereof for a minimum period of twenty years from date of Owner's final acceptance. Warranty and guarantee shall cover all labor and materials required to maintain a watertight condition and a roof system free of defects.

PART TWO - PRODUCTS

2.01 MANUFACTURERS:

A. Acceptable Manufacturers:
   1. Seamen Corp.
   2. Carlisle.
   3. Johns Manville.
   4. Or approved equal.

B. Products furnished for roofing system shall be products of a single manufacturer.

2.02 SINGLE-PLY MEMBRANE ROOFING SYSTEM:

A. Polyester-reinforced fleece-backed elastomeric single-ply sheet compounded with polymer, minimum 0.060-inch thickness, white in color.

B. Acceptable Products; PVC Roof Membrane:
   1. "60 mil FiberTite SM FB" by Seaman Corp.
   2. "Sure-Flex PVC KEE FRS FleeceBack" by Carlisle.
   3. "JM Fleece-Backed PVC Membrane" by Johns Manville.
   4. Or approved equivalent.

2.03 RELATED MATERIAL:

A. Membrane Fasteners and Plates: Heavy duty fasteners for concrete with minimum 50mm (2-inch) diameter steel plate, such as CD-10 or approved equivalent.

B. Flashing: Minimum 60 mil, reinforced or unreinforced flashing membrane as furnished by membrane manufacturer, white in color.

C. Bonding Adhesive: Low solvent or water-based bonding adhesive furnished by membrane manufacturer for substrate.

D. Sealant: Membrane manufacturer's approved sealant to seal penetrations through the membrane system or miscellaneous caulking applications that come in contact with roof system components.

E. Lap/Seam Sealant: As furnished by membrane manufacturer for this system for sealing cut edges of reinforced membrane and flashing.

F. Water Cut-off Mastic: As furnished by membrane manufacturer for this system.

G. Molded Pipe Flashings: White molded pipe flashings as furnished by membrane manufacturer for this system.

H. Walkway Pads: PVC, reinforced walkpads, as approved by membrane manufacturer.

I. Inside and Outside Corners: White pre-fabricated flashings, as furnished by membrane manufacturer.

J. Protection Sheets: Cut sections of membrane with rounded corners extending a minimum of 50mm (2-inches) beyond overlying item.

K. Other miscellaneous materials shall be of the best grade available and approved in writing by roof system manufacturer for the specific application.

PART THREE - EXECUTION

3.00 GENERAL:

A. Perform entire work of this Section in accordance with the best standards of practice relating to trades involved.
B. Follow local, state, and federal regulations, safety standards, and codes. When conflict exists, the more restrictive document shall govern.
C. Follow insurance underwriter's requirements acceptable for use with specified products or systems.
D. Consider roof system manufacturer's current technical specifications a part of this Specification and use as a reference for specific application procedures and recommendations.
E. Mechanically fasten the reinforced membrane to roof deck at roof perimeter conditions as required by the manufacturer.
F. Refer to manufacturer's technical specifications for proper fastener selection and spacing in accordance with specific deck types and appropriate roll width for field of roof and perimeters.

3.01 EXAMINATION OF SURFACES:

A. Verify that all components of the existing roofing system have been removed and other preparatory work has been completed.
B. Examine roof areas for conditions that would prevent proper application of new roofing.
C. Verify that all demolition, renovation, and substrate replacement work has been completed and cured.
D. Examine substrate, roof deck, and related surfaces, and verify that there are no conditions such as inadequate anchorage, foreign materials, moisture, ridges, or other conditions which would prevent the satisfactory installation of the roofing system.
E. Correct or complete any conditions requiring correction or completion prior to installation of roofing system. Notify Owner's Representative in writing of unacceptable conditions.
F. Verify location of all interior ducts, electrical lines, piping, conduit, and/or similar obstructions. Perform all work in such a manner as to avoid contact with the above-mentioned items.
G. Start of work under this Section constitutes acceptance of substrate and site conditions.
H. Verify:
    1. Deck and substrates are clean, smooth, and free from depressions, waves, projections, defects, and damage.
    2. Surfaces in contact with any single-ply material are free from bitumen, grease, oil, or other foreign material.
    3. Surfaces in contact with roofing membrane or separator sheet are free from sharp edges, fins, or projections.
    4. All materials are completely dry and free from ice and snow, including substrate, deck, insulation, and roofing membrane as applicable. Confirm dryness by moisture meter and demonstrate to Owner's Representative.
    5. All roof equipment, openings, curbs, and pipes are solidly and properly set.
    6. All mechanical/electrical work to be covered has been installed, tested, and approved.

3.02 PREPARATION:

A. Verify that debris has been completely removed.
B. Broom clean roof deck immediately prior to roofing application. Debris under roof membrane is unacceptable.

3.03 APPLICATION:

A. Roofing Membrane, General:

1. Install roof membrane in accordance with roofing manufacturer's specification and installation instructions. Cut sheets to maximum size possible in order to minimize seams.
2. Position membrane over substrate without stretching membrane. Allow membrane to relax for one-half hour before bonding, fastening, welding, and flashing.
3. Begin installation of new roofing system at the lowest point of the project area and work to the highest point to prevent backwater laps. This will include completion of all flashings, terminations, and seals on a daily basis.
4. Execute work so membrane can be temporarily sealed on a down slope surface at the end of each day with night-seal in accordance with the detail drawings.
5. Install loose laid roofing system over the field of the roof with the length of the sheets parallel to the long dimension of the roof.
6. Perimeter membrane securement shall be in accordance with manufacturer's recommended procedures for building height and location. Sheet placement shall permit edge, overlaps, and fastening as required by manufacturer.
7. Work shall progress across the roof deck with manufacturer's recommended minimum overlap provided at the previously installed sheet edge.

B. Roof Membrane Installation:

1. Place roof membrane so that wrinkles and buckles are not formed.
2. Overlap roof membrane per manufacturer's special instructions for fleece-back membrane.
3. Lap membrane toward drainage points so that laps do not block water.
4. All cut edges of reinforced membrane must be sealed with edge sealant.
5. Membrane must be mechanically secured at the perimeter along the parapet wall and at penetrations and columns.
6. Heat weld all seams/laps using a hot-air welding machine and a 10,000 watt voltage-controlled generator minimum. Old, outdated welding equipment will not be allowed.
7. Clean/Blow roof membrane to maintain a dirt free, moisture free surface for welding.
8. Round corners of sheet membrane a minimum of 25mm (1-inch).
9. All heat welds shall be continuous, without voids or partial welds.
10. Weld width shall be a minimum of 38mm (1-1/2-inch) for the automatic welding machines. If hand welding, the width of the weld seam shall be a minimum of 50mm (2-inches).
11. Probe all laps each day to verify that welder is set-up and properly welding.
12. Apply a membrane patch over all T-joints of overlapping flashing and membrane.

C. Flashing:

1. Install flashing at all roof penetrations, interruptions, and any roof intersection including roof edges with vertical or sloped surfaces in accordance with manufacturer's recommended procedures and the detail drawings.
2. Raise/modify all curbs, projections, and risewall conditions as required to accommodate new roofing.
3. Remove all existing flashing. Remove existing flashing at any compression type membrane termination to provide for termination directly to the substrate.
4. Apply manufacturer's bonding adhesive to both underside of flashing and surface to which it is to be bonded, at a rate of approximately 3.8 liter (one gallon) per 4.6m_2 (50 square feet) of surface coverage.
5. Do not apply bonding adhesive to that portion of flashing that overlaps onto itself. Use hot-air welding throughout the system where membrane overlaps itself.
6. Allow bonding adhesive to dry to finger touch until it does not string or stick to a dry finger. Roll the flashing into dry adhesive. Take care to assure that flashing does not bridge where there is any change of direction.
7. Mechanically top fasten all flashing under or through appropriate termination bar with approved fasteners as shown in detail drawings.

8. Install flashings for vents, pipe, soil vents, and other round projections in accordance with manufacturer's recommendations and the detail drawings.
9. Install preformed flashing membrane as required to form a continuous membrane seal in each corner or change in plane.
10. Install pre-molded outside and inside corner pieces at appropriate locations at parapets, walls, and curbs.

D. Flashing - Other Penetrations:
1. General:
   a. Flash all penetrations passing through the membrane with pre-formed or field-formed flashings, or polymer-coated metal in accordance with the manufacturer's recommended procedure.
   b. Flashing seal must be made directly to the penetration passing through the membrane system.
   c. All existing flashing must be approved.
   d. Apply sealant or water cut-off mastic at top of flashing between flashing membrane and penetration.
   e. Install grout and pourable sealer in pan. Install sheet metal bonnet or hood/cover at penetrations.
2. Pipes, Round Supports, Etc.:
   a. Flash pipes with molded pipe flashings where their installation is possible.
   b. Where molded pipe flashings cannot be installed, use field fabricated pipe seals.
   c. After pipe flashing is installed, secure with steel draw band and seal top edge with sealant.

E. High Parapet Walls and Rise Walls: Extend flashing up walls to terminate under new receiver flashing, or minimum 8-inches above finished new roof surface and secure with termination bar with fasteners spaced 150mm (6-inches) on-center. Apply water block behind top edge of flashing and apply sealant along top edge of termination bar.

F. Scupper Roof Drains:
1. Install custom fabricated drain inserts made from polymer-clad sheet metal and insert into existing drain holes. Apply continuous bed of sealant around throat of insert prior to installing.
2. Heat weld membrane flashing to flanges of insert.

G. Daily Seal:
1. Ensure that water does not flow beneath any completed sections of membrane system. This will include completion of all flashings, terminations, and daily seals. When possible, install starting at the highest point of the project area, working to the lowest point.
2. Temporarily seal any loose membrane edge with manufacturer's water cut-off sealant. Exercise caution to ensure that membrane is not temporarily sealed in such a manner as to promote water migration below the membrane or impede drainage.
3. Install daily night seals by extending the roof membrane beyond the insulation and sealing to existing roof surface.
4. When work is resumed, remove and dispose of membrane where asphalt or other sealants were previously applied before resuming installation.

3.05 CLEANING:

A. Exterior: Remove debris, adhesives, and sealant from surfaces.
B. Interior: Remove all work related dirt, debris, bitumen, drippage, spills, etc.

END OF SECTION 07533

SECTION 07620

SHEET METAL FLASHING AND TRIM

PART ONE - GENERAL

1.01 SECTION INCLUDES:

A. Shop, field-formed, or pre-manufactured sheet metal work for installation in the roofing systems.
B. Types of work specified in this Section include:
   1. Roof penetration sleeves and bonnet.
   2. Metal counter flashing.
   3. Scupper drain inserts.
   4. Miscellaneous sheet metal accessories.

1.02 RELATED SECTIONS:

A. 02072 - Minor Demolition and Renovation Work.
B. 07533 - Thermoplastic Single-ply Membrane.
C. 07920 - Joint Sealants.

1.03 REFERENCES:

A. American Society for Testing and Materials (ASTM).
B. Federal Specifications (FS).
C. National Roofing Contractor's Association (NRCA): NRCA Roofing and Waterproofing Manual, Latest Edition.
D. Sheet Metal and Air Conditioning Contractor's National Association, Inc. (SMACNA): Architectural Sheet Metal Manual, Latest Edition.

1.04 WARRANTY:

A. Contractor's Warranty: Provide Owner a written warranty which shall warrant sheet metal work to be free of leaks and defects in materials and workmanship for two years after date of final acceptance by Owner.
B. For pre-finished metal, provide manufacturer's twenty year guarantee covering deterioration or failure of the fluoropolymer finish.

PART TWO - PRODUCTS

2.01 MANUFACTURERS:

A. Acceptable Pre-finished Sheet Metal Manufacturers:
   1. Berridge Manufacturing Company.
   2. Peterson Aluminum Corporation (PAC CLAD).
   3. Architectural Building Components (ABC).
   4. Metal Building Components, Inc. (MBCI).
   5. Or approved equal.

2.02 SHEET METAL MATERIAL:

A. Pre-finished Metal: "Kynar 500" or "Hylar 5000" fluoropolymer pre-finished G90 galvanized/galvalume sheet metal, minimum 24 gauge. "Kynar 500" or "Hylar 5000" finish shall consist of a two coat Polyvinyladine flouride, minimum 70 percent by

weight in coatings, dry film thickness 1 mil, factory applied by metal manufacturer or supplier. Color as selected by Owner from manufacturer's standard color chart.

B. Polymer-coated Metal: 24 gauge G-90 galvanized steel base metal laminated with polymer coating, 1mm (0.020-inch) thick, compatible with thermoplastic sheet membrane such as "FiberTite FiberClad Coated Metal" by Seaman, "SarnaClad" by Sarnafil, or as approved by membrane material manufacturer.
C. Stainless Steel: ASTM A240, Type 304, ASTM A480, No. 2B/2D brush finish, gauge as scheduled.

2.03 FASTENERS:

A. Fasteners shall be same metal as flashing and sheet metal being joined.
B. Exposed fasteners shall be self-sealing or gasketed for watertight installation.
C. Heads of fasteners, including but not limited to, rivets, screws, and bolts, that are exposed or visible shall have same manufactured finishes as item being secured; color to match when applicable.
D. Mechanical Fasteners:
    1. Refer to Section 02072 – Minor Demolition and Renovation Work.
    2. Washers: Steel washers with bonded rubber sealing gasket.
    3. Screws: Self-tapping sheet metal type compatible with material fastened.
    4. Rivets: Stainless steel material for the stem, closed end, color to match sheet metal items being adjoined.

2.04 RELATED MATERIALS:

A. Solder: ASTM B 32, alloy grade 58, 50 percent tin, 50 percent lead.
B. Flux: Phosphoric acid type, manufacturer's standard; Acid-chloride type flux, for use with stainless steel; except use rosin flux over tinned surfaces.
C. Adhesives: Type recommended by flashing sheet manufacturer for waterproof and weather resistant seaming and adhesive application of flashing sheet.
D. Metal Accessories: Sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gauge required for performance.
E. Base Material for Flashing Pans:
    1. Flashing Pans 300mm by 300mm (12-inch by 12-inch) and Smaller: Quick-setting grout formula meeting Corps of Engineers specification CRD-C-621, Type D.
    2. Flashing Pans Larger than 300mm by 300mm (12-inch by 12-inch): Spray-foam such as “FrothPak” by InstaFoam.
F. Sealant:
    1. Type A: One component polyurethane sealant such as "SikaFlex" by Sika Corp. color to match finish of adjacent material.
    2. Type B: Low modulus silicone sealant such as "Sika-Sil WS-290” by Sika Corp., “795 Silicone Building Sealant”, “790 Silicone Building Sealant”, or "CWS" by Dow Corning, or “GE Silpruf SCS 2000” by Momentive Technologies; color to match finish of adjacent material.
    3. Type C: Self-adhering elastomeric butyl tape, 3mm (1/8-inch) by 9mm (3/8-inch), such as "Extru-Seal" by Pecora Corp.
    4. Type D: One-part gun grade butyl rubber sealant such as "BC-158" by Pecora.
G. Pourable Sealer:
    1. Pourable polyurethane sealer, approved by roofing system manufacturer.
    2. Acceptable Products:
        a. "Pourable Sealer S-10" by Firestone.

b. "1-Part Pourable Sealer" by Chem-Link.

H. Termination Bar: 3mm (1/8-inch) thick, 25mm (1-inch) wide extruded aluminum bar with flat profile, factory punched oval holes (6mm by 9mm [1/4-inch by 3/8-inch]) spaced 150mm (6-inches) on-center, such as "TB 125" by The TruFast Corp. or “Heavy Flat Bar” by OMG.

I. Stainless Steel Clamp: Stainless steel banding with worm-drive tightening, sized for application such as "Make-A-Clamp Kit" by Dynamic Fastener, 800/821-5448.

2.05 FABRICATION - GENERAL:

A. Fabricate work in accordance with SMACNA Architectural Sheet Metal Manual and other recognized industry practices and reviewed shop drawings.

B. Comply with material manufacturer's instructions and recommendations for forming material.

C. Shop-fabricate work to greatest extent possible. Fabricate inside and outside corners for metal edges, counterflashing, and coping caps. Fabricate corners with equal length legs, minimum 1.2m (2 feet).

D. Fabricate for waterproof and weather resistant performance with expansion provisions for running work sufficient to permanently prevent leakage, damage, or deterioration of work. Form work to fit substrates.

E. Make angle bends and folds for interlocking metal with full regard for expansion and contraction to avoid buckling or fullness in metal after installation.

F. Form materials with straight lines, sharp angles, smooth curves, and true levels. Avoid tool marks, buckling, and oil canning.

G. Fold back edges on concealed side of exposed edge to form hem.

H. Lap joints 25mm (1-inch) minimum. Rivet and solder joints on parts that are to be permanently and rigidly assembled for copper, stainless, aluminum, and galvanized steel sheet metal. Install rivets, spaced 25mm (1-inch) on-center and apply solder to secure and seal exposed edge of sheet metal in a uniform continuous bead with smooth top finish. Clean residue upon completion of soldering process. Fabricate sheet metal assemblies so that adjoining sections are nested to achieve continuous metal-to-metal contact.

I. Seams:

1. Fabricate non-moving seams in sheet metal with flat-lock seams.
2. Pre-finished Galvanized Steel: Seal pre-finished metal seams with rivets, spaced 25mm (1-inch) on-center, and silicone sealant, color to match metal finish.
3. Metal Other than Aluminum: Tin edges to be seamed, form seams, and solder.

J. Expansion Provisions: Where lapped or bayonet type expansion provisions in work cannot be used or would not be sufficiently waterproof or weatherproof, form expansion joints of intermeshing hooked flanges, not less than 25mm (1-inch) deep, filled with mastic sealant concealed within joints.

K. Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant in compliance with SMACNA standards.

2.06 FABRICATED ITEMS:

A. Receivers and Counterflashings: Minimum 24 gauge stainless steel sheet metal formed in maximum 3m (10 foot) lengths; fabricate "S"-shaped receiver to engage counterflashing a minimum of 25mm (1-inch); fabricate counterflashing with broken fascia of length to extend over top edge of base flashing a minimum of 100mm (4-inches) with 13mm (1/2-inch) hemmed drip edge.

B. Scupper Drain Insert: Custom constructed cylindrical throat/stem, 200mm (8-inches) in length with 100mm (4-inch) flanges, diameter to suit existing conditions.
C. Wind Clips: Minimum 24 gauge stainless steel sheet metal, 25mm (1-inch) wide, length to engage counterflashing a minimum of 13mm (1/2-inch).
D. Roof Penetration Pan and Bonnet: Polymer-coated metal base with 24 gauge prefinished galvanized sheet metal bonnet.

PART THREE - EXECUTION

3.01 EXAMINATION:

A. Verify that substrates are smooth and clean to extent needed for sheet metal work.
B. Verify that reglets, nails, cants, and blocking to receive sheet metal are installed and free of concrete and soil.
C. Do not start sheet metal work until conditions are satisfactory.

3.02 INSTALLATION:

A. Install sheet metal with lines, arises, and angles sharp and true, and plane surfaces free from objectionable wave, warp, or buckle. Exposed edges of sheet metal shall be folded back to form 6mm (1/4-inch) hem on concealed side from view. Finished work shall be free from water retention and leakage under all weather conditions. Install prefabricated corners or transitions at changes in direction, elevation or plane, and at intersections. Locate field joints not less than 300mm (12-inches), nor more than 1m (3 feet) from actual corner. Laps for all metals, except for prefinished metal, shall be 25mm (1-inch) wide, fastened with rivets spaced 25mm (1-inch) on-center and soldered.
B. Anchor units of work securely in place to prevent damage or distortion from wind or buckling. Provide for thermal expansion of metal units; conceal fasteners where possible; and set units true to line and level as indicated. Install work with laps, joints, and seams permanently watertight and weatherproof.
C. Install fabricated sheet metal items in accordance with manufacturer's installation instructions and recommendations and with SMACNA Architectural Sheet Metal Manual.
D. Separations: Provide for separation of metal from non-compatible metal or corrosive substrates by coating concealed surfaces with zinc chromate, bituminous coating, or other permanent separation at locations of contact as recommended by manufacturer or fabricator. Do not use materials incompatible with roofing system.
E. Continuous Cleat: At exposed edges of gravel guards, fascias, cap flashings, and where required, attach continuous cleat at 150mm (6-inches) on-center with appropriate fasteners positioned on the vertical face. At a distance of 3m (10 feet) from each direction of corner, install fasteners 75mm (3-inches) on-center. Install cleat so fascia extends a minimum of 25mm (1-inch) below top of exterior wall finish.
F. Counterflashings:
    1. Install new counterflashings along rise and parapet walls to extend a minimum of 100mm (4-inches) below top edge of base flashing.
    2. Secure counterflashing at 150mm (6-inches) on-center with self-tapping screws.
    3. Saw-cut reglet mounted assemblies: Saw cut new joint, 13mm by 25mm (1/2-inch by 1-inch) deep, in existing masonry/concrete where required and to install new receiver. Clean and prepare joint surfaces to receive sealant and insert receiver into joint. Secure new receiver in place with lead wedges spaced 300mm (12-inches) on-center wedged into joint. Install backer rod into saw-cut reglet and apply a continuous bead of sealant, Type B, along reglet and top edge

of receiver and tool sealant to provide outward sloping finished surface. Secure counterflashing to receiver utilizing self-tapping grommetted screws spaced 150mm (6-inches) on-center.

4. Surface-mounted assemblies: Secure 2-piece surface-mounted receiver and counterflashing assemblies along concrete substrates. Install sealant tape, Type C, between receiver and substrate. Secure receiver to substrate with termination bar and appropriate fasteners spaced 300mm (12-inches) on-center. Install a continuous bead of sealant, Type B, along caulk trough/top edge of receiver and tool sealant to provide outward sloping finished surface. Secure counterflashing to receiver utilizing grommetted self-tapping screws spaced 150mm (6-inches) on-center.
5. Lap adjacent sections of receivers and counterflashings a minimum of 100mm (4-inches). Apply a continuous bead of sealant, Type B, in lap.
6. Install wind clips to termination bar spaced 600mm (24-inches) on-center and engage drip edge of counterflashing a minimum of 13mm (1/2-inch).

7. Fabricate the counterflashing to form an integral closure at terminations.

G. Roof Penetration Hoods and Bonnet:
1. Install watertight bonnet at penetration locations.
2. Round or Pipe Penetrations:
   a. Set bonnet in sealant, Type A; utilize Type B sealant at heat sensitive areas.
   b. Tighten draw band.
   c. Seal top of bonnet with sealant, Type A; utilize Type B sealant at heat sensitive units.
3. Square Penetration:
   a. Secure bonnet to penetration with self-drilling screw.
   b. Set bonnet in sealant, Type C.
   c. Seal top of bonnet with sealant, Type B.

H. Drain Insert:
1. Install drain insert after installation of membrane base ply.
2. Properly clean and repair existing drain piping or opening in deck.
3. Trim flange of insert to ensure a proper fit, where necessary. Set flange of drain insert in bed of sealant.
4. Secure flange of insert to deck with appropriate fasteners and strip-in with membrane flashing.

3.03 CLEANING:

A. Remove flux and residual acid immediately by neutralizing with baking soda and washing with clean water. Leave work clean and free of stains, scrap, and debris.
B. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration/damage of finishes. Paint (color to match) areas of prefinished metal where finish is damaged. Replace sheet metal items when damaged finish can not be repaired to an acceptable condition.
C. Prime soldered area of phosphatized metal after cleaning to prevent rusting.
D. Clean and/or paint metal flashings that have been soiled from work. Use medium nap roller to apply paint to surfaces to achieve monolithic finished color.

END OF SECTION 07620

SECTION 07920

JOINT SEALANTS

PART ONE - GENERAL

1.01 SECTION INCLUDES:

A. Installation of sealants on counter flashings, cap flashing, and roofing related sheet metal flashings.
B. Installation of sealants in control joints in vertical walls.
C. Installation of sealant at perimeter of door, openings, and penetrations in walls.
D. Crack repairs in concrete and plaster finishes.

1.02 RELATED SECTIONS:

A. 02072 - Minor Demolition and Renovation Work.
B. 03610 - Epoxy Resin Injection
C. 03730 - Concrete Rehabilitation.
D. 07620 - Sheet Metal Flashing and Trim.
E. 09830 - Elastomeric Coating

1.03 REFERENCES:

A. American Society for Testing and Materials (ASTM).
B. Federal Specifications (FS).

1.04 SUBMITTALS:

A. Product Data: Submit manufacturer's product data, joint preparation and installation instructions, and color charts for each product required.
B. Submit manufacturer's certification that products meet specified requirements and are appropriate for project applications.
C. Samples for Initial Selection Purposes: Submit manufacturer's standard bead samples consisting of strips of actual products showing full range of colors available for each product exposed to view.

1.05 QUALITY ASSURANCE:

A. Product Labels: Include manufacturer's name, type of sealant, and color on labels of containers.
B. Single Source Responsibility for Joint Sealer Materials:
    1. Obtain joint sealer materials from single manufacturer for each different product required.
    2. Provide primers, joint sealers, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by testing and field experience as supplied and warranted by one manufacturer.
    3. Provide joint sealers that have been produced and installed to establish and maintain watertight and airtight continuous seals.
C. Installer Qualifications: Installer having not less than five years successful experience in comparable projects and employing personnel skilled in operations required for project.

D. Field Sample: Upon directions of Owner's Representative, prepare 300mm (12-inch) samples in presence of Owner's Representative demonstrating removal and cleaning process and application of sealant.

E. Use test methods standard with manufacturer to determine if priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealers to joint substrates under environmental conditions that will exist during actual installation.

F. Installer to perform field adhesion in peel testing using hand pull method. Perform a minimum of one test on every type of substrate and joint condition.

1. Test Method: Test joint sealers by hand pull method described below:
   a. Install joint sealants in 1m (3 foot) joint lengths using same materials and methods for joint preparation and joint sealant installation required for complete work. Allow sealants to cure fully before testing.
   b. Make knife cuts as follows: A horizontal cut from one side of joint to the other followed by two vertical cuts approximately 50mm (2-inches) long at side of joint and meeting horizontal cut at top of 50mm (2-inch) cuts. Place a mark 25mm (1-inch) from top of 50mm (2-inch) piece.
   c. Use fingers to grasp 50mm (2-inch) piece of sealant just above 25mm (1-inch) mark; pull firmly down at a 90 degree angle or more while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for ten seconds.
2. Report whether or not sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.
3. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of non-compliance with requirements, will be considered satisfactory. Do not use sealants which fail to adhere to joint substrate during testing.
4. Repair test cut areas immediately after completion of testing work.

1.06 DELIVERY, STORAGE, AND HANDLING:

A. Deliver materials in original containers with seals unbroken and labels intact.
B. Store materials in a single lockable area of project site.
C. Protect materials from extreme temperatures and exposure. Store in accordance with manufacturer's recommendations.

1.07 PROJECT CONDITIONS:

A. Environment: Comply with sealant manufacturer's recommended minimum and maximum installation temperatures and other weather protection.

1.08 SEQUENCING AND SCHEDULING:

A. Do not remove more sealant than can be replaced in same day.

1.09 WARRANTY:

A. Manufacturer's Warranty: Provide manufacturer's standard warranty for type of sealant specified.
B. Contractor's Warranty: Provide written warranty against leakage and defects in workmanship for a period of two years from date of final acceptance by Owner.

PART TWO - PRODUCTS

2.01 SEALANT:

A. Sealant:
   1. Type A: One component polyurethane sealant such as "SikaFlex-1a" by Sika Corp.
   2. Type B: Medium modulus, neutral curing silicone sealant such as "SikaSil WS 290" or "WS 295" by Sika Corp., or "795 Building Sealant" by Dow Corning.
   3. Type C: Self-adhering preformed 100% solids elastomeric butyl tape, 6mm thick by 19mm wide, such as "TremPro 691" by Tremco.
   4. Type D: Non-slump moisture curing structural sealant, gray in color, such as "M-1 Structural Sealant" by ChemLink, Inc.
   5. Type E: Self-leveling silicone sealant for stone to asphalt joint; one part, low-modulus, 100/50 movement such as "890-SL" by Dow Corning.
   6. Type F: Non-sag, one part, low-modulus silicone sealant for horizontal joints such as "888 Silicone Joint Sealant" by Dow Corning.

2.02 RELATED MATERIALS:

A. Cleaner: Noncorrosive, nonstaining type, compatible with joint forming materials as recommended by sealant manufacturer.
B. Backer Rod: Round flexible polyolefin foam rod with non-absorbing outer skin and interior network of both open and closed cells; ASTM C 1330, Type B; over-sized 30 to 50 percent for joint size, compatible with sealant, sized and shaped to provide proper compression upon insertion in accordance with manufacturer's recommendations such as "SofRod" by Construction Foam Products, a Division of Namaco.
C. Bond Breaker Tape: Low-density polyethylene strip with pressure sensitive adhesive such as "Pecora 531 Bond Breaker Tape" by Pecora Corp.
D. Primer: Nonstaining type as recommended by sealant manufacturer to suit application.
E. Masking Tape: Nonstaining, nonabsorbent type compatible with sealant and surfaces adjacent to joints.

2.03 MIXING:

A. Mix multi-component products as directed by manufacturer.

PART THREE - EXECUTION

3.01 PREPARATION:

A. Removing Existing Sealants and Mortar:
   1. Cut out and remove existing sealants, backer rods, bond breaker tapes, mortar and other loose materials to depth as required by sealant manufacturer or to 13mm minimum.
   2. Remove foreign matter from joint substrates which could interfere with adhesion of joint sealant. Remove dust, oil, grease, waterproofing, water repellent, surface dirt, and paints, except for permanent protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer.
   3. Remove debris from jobsite.

B. Cleaning:

1. Clean joints receiving sealant and adjacent surfaces in manner not to damage existing materials. Perform cleaning of joints the same day sealant is to be installed in cleaned joint.
2. Remove dust and debris by blowing clean with powered force air equipment.
3. Wipe nonporous surfaces clean with toluene or xylene and clean 100 percent cotton cloths. Solvent wipe nonporous surfaces a second time with clean 100 percent cotton cloths.

C. Priming:

1. Prime joint substrates where indicated or where recommended by sealant manufacturer based upon preconstruction sealant substrate tests or prior experience.
2. Apply primer to comply with joint sealer manufacturer's recommendations. Apply primer to surfaces the same day sealant is to be installed onto primed surfaces.
3. Confine primers to area of joint sealer bond. Do not allow spillage or migration onto adjoining surfaces.

D. Masking: Mask areas adjacent to joints to prevent sealant contact with surfaces which would be permanently stained or damaged by sealant or by cleaning methods required to remove excess sealant.

3.02 APPLICATION:

A. Joint Backing:

1. To achieve required joint depths, restrict depth of joints by use of joint backer rod.
2. Size backer rod to allow for 30 percent minimum compression of the backer rod when installed.
3. Where joint backing material is not feasible due to insufficient clearance or depth, install bond breaker tape in joint.
4. Three-sided adhesion of sealant is not permitted.

B. Sealant:

1. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates.
2. Apply sealant in uniform continuous bead without gaps or air pockets, following manufacturer's instructions for each specific type of sealant.
3. Provide uniform cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.
   a. Provide for minimum sealant thickness of 1/4-inch.
   b. Provide for minimum sealant adhesion to substrate of 1/4-inch.
   c. Provide a minimum width-to-thickness ratio of 2:1.
4. Apply cap bead of sealant over exposed fastener heads securing items and lap joints in sheet metal components, completely concealing fastener and exposed edge of lap with sealant.
5. Apply fillet-shaped bead of sealant along surface-mounted counterflashings, caulk troughs, and other similar conditions.

C. Tooling:

1. Tool joints to required configuration in accordance with manufacturer's recommendations.
2. Sealant Tape:
   a. Provide continuous uniform bed of sealant tape on bearing surfaces. Butt adjacent sections end-to-end.
   b. Prior to mating surfaces, remove backing paper from the installed tape.

c. Firmly press or clamp assembly upon removal of backing paper.

3. Tooling Non-sag Sealants:
   a. Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration required.
   b. Eliminate air pockets and ensure contact and adhesion of sealant with sides of joint.
   c. Remove excess sealant from surfaces adjacent to joint.
   d. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by manufacturer.
   e. "Dust" wet sealant with matching color sand or crushed masonry fines to match adjacent masonry, concrete, mortar, or plaster surfaces in color and texture.

D. Remove masking immediately after tooling without disturbing joint sealant.

3.03 ADJUSTING:

A. If damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

3.04 CLEANING:

A. Remove excess sealant from adjacent surfaces immediately after contact with xylene or toluene.
B. Remove debris and containers from jobsite.

3.05 PROTECTION:

A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion.

3.06 SCHEDULE:

A. Sealant A:
   1. Temporary weather-protection.
   2. Routed cracks.

B. Sealant B:
   1. Metal-to-metal joints (metal edge cover plates, counterflashing lap joints, etc.).
   2. Wet sealing windows.
   3. Perimeters of window frames, doors, openings, and penetrations.
   4. Control joints in vertical walls.

C. Sealant C:
   1. Surface mounted counterflashings; between counterflashing and substrate.

D. Sealant D:
   1. Adhesion of surface-mounted objects.

E. Sealant E:
   1. Joints between building and asphalt pavement.

F. Sealant F:
   1. Concrete-to-concrete horizontal joints.

END OF SECTION 07920

SECTION 09830

ELASTOMERIC COATING

PART ONE - GENERAL

1.01 SECTION INCLUDES:

A. Application of coating system to concrete and plaster surfaces at exterior walls, including crack repair, surface preparation, priming, and top coats.

1.02 RELATED SECTIONS:

A. 02072 - Minor Demolition and Renovation Work.
B. 03610 - Epoxy Resin Injection.
C. 03730 - Concrete Rehabilitation.
D. 07920 - Joint Sealants.

1.03 SUBMITTALS:

A. Provide submittals in accordance with Section 01300 - Submittals.
B. Product Data: Submit manufacturer's technical information including basic material analysis, installation instructions, Material Safety Data Sheets (MSDS), and color chart for each material specified. List each material and cross-reference to the specific coating and finish system and application. Identify by manufacturer's catalog number and general classification.
C. Samples: Use representative colors when preparing samples for review. Submit 300mm by 300mm (12-inch by 12-inch) samples on hardboard for Government's COR review of color and texture only. Provide a listing of material and application for each coat of each finish sample.
D. On wall surfaces, duplicate coating finishes of prepared samples. Provide 1m by 1m (3 foot by 3 foot) full-coat finish sample of surface as directed until required sheen, color, and texture is obtained. Sample to be representative of surface preparation, primer application, and elastomeric coating application to be used in the completed Work. Simulate finished lighting conditions for review of in-place Work.
E. Final acceptance of colors will be from samples applied on job. Accepted sample may not remain as part of Work.

1.04 QUALITY ASSURANCE:

A. Single Source Responsibility: Provide primers and other undercoat material produced by same manufacturer as finish coats. Use only thinners approved by coating manufacturer, and use only within recommended limits.
B. Installer: Firm having not less than five years successful experience in comparable projects and employing personnel skilled in restoration processes and operations specified.
C. Perform adhesion tests on installed cured sample or samples on each substrate prior to beginning elastomeric coating installation. Perform test in accordance with ASTM D 3359, Test Method A.
D. Perform adhesion testing of patching compound and sealants used to repair cracks in existing substrate.

1.05 DELIVERY, STORAGE, AND HANDLING:

A. Deliver and store materials in accordance with Section 01500 - Temporary Facilities and Controls.
B. Deliver materials in original, new, unopened packages and containers bearing manufacturer's name and label, and following information:

1. Manufacturer's name.
2. Name or title of material and type of coating.
3. Federal Specification number, if applicable.
4. Manufacturer's stock number, date of manufacture, and batch number.
5. Contents by volume, for major pigment and vehicle constituents.
6. Thinning and mixing instructions.
7. Application instructions.
8. Color name and number.

C. Store materials not in actual use in tightly covered containers outside of building. Maintain containers used in storage of coatings in a clean and dry condition, free of foreign materials and residue. Store rags, solvent, and coatings in closed metal container, located in designated areas.

D. Keep storage area neat and orderly. Remove rags and waste daily.

E. Protect from freezing where necessary.

F. Take precautions to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing, and application of special coatings. Take all precautions required to prevent fires.

1.06 PROJECT CONDITIONS:

A. Do not apply coatings when the temperature of surfaces to be coated and the surrounding air temperatures are below 7 degrees Celsius, unless otherwise permitted by coating manufacturer's printed instructions.

B. Do not apply coatings in snow, rain, fog, or mist or when relative humidity exceeds 85 percent or to damp or wet surfaces unless otherwise permitted by coating manufacturer's printed instructions.

C. Coating work may be continued during inclement weather only if areas and surfaces to be coated are enclosed and heated within temperature limits specified by coating manufacturer during application and curing periods.

D. Protect persons, motor vehicles, surfaces adjacent to areas being restored, building site, and surrounding buildings from injury, contamination, soiling, and damage resulting from the coating work.

E. Furnish and erect temporary barricades and protection at pedestrian walkways and at points of entrance and exit.

1.07 SEQUENCING AND SCHEDULING:

A. Coordinate coating application with waterproofing, concrete, and masonry repairs to prevent damage, staining, or discoloration of new coating and other building systems. Repair damage at no additional cost to Owner.

B. Allow concrete repairs to cure a minimum of fourteen days. Provide longer cure time if ambient temperatures are less than 21 degrees Celsius (70 degrees Fahrenheit).

1.08 WARRANTY:

A. Manufacturer's Guarantee: Provide written five year manufacturer's labor and material guarantee against leakage and defects in workmanship and material from date of Substantial Completion.

B. Contractor's Warranty: Provide Owner a written two year Contractor's labor and material warranty against leakage and defects in workmanship and material from date of Substantial Completion.

1.09 ADDITIONAL STOCK:

A. Provide one unit container each of primer and each finish coat to Owner in accordance with the provisions of Section 01300 - Submittals.

B. Label each container with material name and type, color, texture, and application location, in addition to manufacturer's label.

PART TWO - PRODUCTS

2.01 ELASTOMERIC COATING:

A. Acrylic Coating for CMU, Clay Block, and Plaster Surfaces: Waterproof elastomeric water-based (V.O.C. compliant) coating formulated from acrylic polymers and designed to retain its elasticity and flexibility, textured detail coat, smooth finish coat.
   1. “Thorolastic”, BASF.
   2. “Sikagard 550W ElastoColor”, Sika Corporation.
   3. Or approved equal.

B. Acrylic coating for concrete surfaces, textured detail coat, smooth finish coat.
   1. "Thorocoat", BASF.
   2. "Sikaguard 670W", Sika Corporation.
   3. Or approved equal.

C. Primer: Suitable for chalky or previously painted substrates, compatible with acrylic coating.
   1. "ThoroPrimer 1000", BASF.
   2. Or approved equal.

2.02 RELATED MATERIALS:

A. Polyurethane Sealant: Refer to Section 07920 – Joint Sealants, Sealant Type A,. Cured sealant shall be compatible with elastomeric coating.

B. Patching Compound: As recommended by coating manufacturer.

2.03 MIXING:

A. Carefully mix and prepare materials in accordance with manufacturer's directions.

B. Maintain containers used in mixing and application of coating in a clean condition, free of foreign materials and residue.

C. Stir materials before application to produce mixture of uniform density. Stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

D. Tinting:
   1. Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of same material are to be applied.
   2. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
   3. Finish Color: To be selected by Owner.

PART THREE - EXECUTION

3.01 PROTECTION:

A. Protect work of other trades, whether to be coated or not, against damage.

B. Protect existing stairs, doors, and ductwork in areas to be coated.

C. Remove and reinstall existing signage if affected by the work.

3.02 PREPARATION:

A. Clean surfaces, repair delaminated or unsound surfaces, and repair cracks with sealant and patching compound in accordance with coating manufacturer's written recommendations.

B. Remove all loose particles, loose or delaminated paint, oil, grease, laitance, efflorescence, mold, mildew, and other foreign material. Substrate shall be dry.

C. Primer application is required if substrate is chalky after cleaning and proper surface preparation.
D. Crack Preparation:
1. Cracks Less Than 1mm (1/32-inch): Patch in accordance with acrylic coating manufacturer's written instructions.
2. Cracks in Excess of 1mm (1/32-inch):
a. Grind or rout cracks to 6mm by 6mm (1/4-inch by 1/4-inch) and remove dust.
b. Fill cracks until flush with surface with patching compound or Sealant Type A in accordance with manufacturer's recommendations.
3. Apply light coat of sand to patching compound or sealant before repair material cures. Sand to match size, texture, and appearance of adjacent substrate.
4. Perform adhesion testing of sealant or patching compound used to repair exterior substrates.
5. Prepare substrate area to be coated in accordance with coating manufacturer's recommendations.

F. Mask over sealant joints in areas to receive new coating.

3.03 APPLICATION:

A. Acrylic Coating Application to Concrete and Plaster Surfaces:
1. Prime Coats:
a. Before application of finish coats, apply prime coat in a thin spray or roll coat to surface to be coated.
b. Recoat primed and sealed substrates where there is evidence of suction spots or unsealed areas in first coat to assure a finish coat with no burn-through or other defects due to insufficient sealing.
2. Apply textured detail coat over crack repairs and concrete repairs in areas to receive acrylic coating. Allow detail coat to dry before applying base and finish coats.
3. Apply coating by brush, roller, airless spray, or other application method in accordance with coating manufacturer's directions. Use brushes best suited for type of material being applied. Use rollers as recommended by manufacturer for material and texture required.
4. Do not apply coating over sealant joints.
5. Apply coating system with a minimum of two coats or more if required to prevent bleed through of substrate color. Apply additional coats when topcoats or other conditions show through final coat until cured film is of uniform finish, color, and appearance. Apply finish in pinhole free, continuous membrane.
6. Minimum Coating Thickness:
a. Number of coats and finished coating film thickness required is same regardless of application method.
b. Do not apply succeeding coats until previous coat has cured as recommended by coating manufacturer.
c. Apply each material no thinner than manufacturer's recommended spreading rate.
d. Provide total dry film thickness of entire coating system as required by manufacturer unless otherwise indicated.
7. Brush Applications:
a. Brush-out and work brush coats onto surfaces in an even film.
b. Eliminate cloudiness, spotting, pin holes, laps, brush marks, runs, sags, ropiness, or other surface imperfections.
8. Roller Applications: On porous substrates, backroll to eliminate pinholing. Do not dry roll.
9. Match approved samples for color, texture, and coverage.
10. Remove masking over sealant joints immediately after completion of coating work.

3.04 FIELD QUALITY CONTROL:

A. Government reserves right to invoke following material testing procedures at any time and any number of times during period of field application:
   1. Government will engage services of independent testing laboratory to sample materials being used. Samples of materials delivered to project site will be taken, identified and sealed, and certified in presence of Contractor.
   2. Testing laboratory will perform appropriate tests for any of following characteristics: adhesion, abrasion resistance, apparent reflectivity, flexibility, washability, absorption, accelerated weathering, dry opacity, accelerated yellowness, recoating, skinning, color retention, alkali resistance, and quantitative materials and analysis.
   3. If test results show materials being used do not comply with specified requirements, Contractor may be directed to stop work and remove non-complying materials, pay for testing, recoat surfaces coated with rejected materials, and remove rejected materials from previously coated surfaces if, upon recoating with specified materials, the two coatings are incompatible.

3.05 ADJUSTING:

A. Correct damage by cleaning, repairing or replacing, and recoating as directed by Consultant. Leave work in undamaged condition. Replace any material or surfaces damaged, or restore if possible, to original condition.

3.06 CLEANING:

A. During progress of work, remove discarded materials, rubbish, cans, and rags resulting from work from project site daily.
B. Furnish and lay drop cloths in areas where coating and finishing is being done. Protect floors, sidewalks, windows, roofs, equipment, stairs, and other surfaces from dripping materials. Where it becomes necessary to remove temporary coverings protecting material in place in order to proceed with work, replace or provide other satisfactory means of protection.
C. Promptly clean off spots of coating, oil, and stains from floors, walls, roof areas, sidewalks, hardware, and other surfaces. Do not allow them to accumulate, dry, or harden. Upon completion of the work, check finished surfaces, clean off previously undetected spots and stains used in coating and finishing from the building, and leave entire building in clean condition insofar as coating and finishing work is concerned.
D. Upon completion of work, clean coating-spattered surfaces. Remove spattered materials by proper methods of washing and scraping, using care not to damage finished surfaces.
E. Maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.

3.07 PROTECTION:

A. Protect work of other trades against injury or damage during and because of coating and finishing operations.
B. Provide "Wet Paint" signs and barricades as required to protect finishes. After coating application, remove temporary protective wrappings provided by others for protection of their work during coatings operation.

END OF SECTION 09830

SECTION 15100

TEMPORARY MECHANICAL DISCONNECTS

PART ONE - GENERAL

1.01 SECTION INCLUDES:

A. Pre-testing of mechanical units, temporary raising, and disconnects of mechanical units including disconnects, reinstallation of units as shown on the drawings, and re-testing and correction of deficiencies caused by the Work.

1.02 QUALITY ASSURANCE:

A. The Contractor shall employ mechanics proficient in the trades involved.
B. The Contractor shall disconnect mechanical equipment only as scheduled in the approved construction schedule and when performing roofing work in the immediate area of the equipment.
C. Each unit shall be fully operational immediately after reinstallation. Shut-down time for each unit shall be limited to a four hour period unless otherwise agreed in writing by Owner.
D. Prior to commencing any disconnections, the Owner shall be given forty-eight hour notice.

1.03 TESTING:

A. Prior to commencing roofing work, the Contractor shall test all mechanical units in the presence of the Owner.
B. All deficiencies in operation including unusual noises will be noted in writing and shall become a matter of records.
C. Upon completion of the reinstallation of each unit, it shall be retested by the Contractor in the presence of the Owner.
D. Any deficiencies which were not noted in the initial testing shall be corrected by the Contractor at his expense.

PART TWO - PRODUCTS

2.01 MATERIALS:

A. Any replacement parts or additional materials needed due to changes in curb or sleeper heights shall be as recommended by the manufacturers of the mechanical unit or as required by governing codes, and shall match the existing materials as to type, size, thickness, and quality.

PART THREE - EXECUTION

3.01 INSTALLATION:

A. After disconnection, move units sufficient distance to permit the installation of the new supports or curbs, where indicated on drawings, and new roofing and flashing materials.
B. Units shall be moved onto existing roofing to the maximum extent possible.
C. Provide plywood traffic ways for moving units, including under equipment used for moving units for its full route of movement.

D. Under no circumstances shall any mechanical units be stored on completed sections of the new roof or any adjoining roofs not included in this contract.
E. After installation of equipment support (if required), the unit shall be reset on the support. Reconnecting of pipe, conduit, wiring, and reactivation of the unit to its original condition shall be provided by Contractor. All conduit modifications, extension of ductwork, etc., shall be provided by Contractor at no additional cost to Owner.
F. Units shall be installed level, plumb, and free of vibration and in accordance with unit manufacturer's original installation practices.

END OF SECTION 15100

SECTION 16100

TEMPORARY ELECTRICAL DISCONNECTS

PART ONE - GENERAL

1.01 SECTION INCLUDES:

A. Temporarily disconnect all rooftop electrical equipment or circuits including fans, rooftop circuits, light fixtures, and HVAC units as needed, but excluding wiring and cabling for communications equipment. Communications equipment shall be disconnected, moved out of the way of construction activities, and reinstalled by a separate Owner's Contractor. General Contractor shall coordinate work to ensure a minimum disruption to the Communications equipment. Construction schedule shall be such that no single piece of communications is required to be moved and disconnected for longer than two hours and that no more than one quarter of all communication equipment is required to be moved and disconnected at the same time. No piece of communication equipment shall be moved or disconnected without prior written authorization from the Owner.

1.02 QUALITY ASSURANCE:

A. The Contractor shall employ electricians licensed in the electrical trade.
B. The Contractor shall disconnect electrical equipment or feeds only as scheduled in the approved construction schedule and when performing roofing work in the immediate area of the equipment or feed.
C. Each feed or unit shall be fully operational immediately after reinstallation. Shut-down time for each unit shall be limited to a four hour period unless otherwise agreed in writing by the Owner.
D. Prior to commencing any disconnections, the Owner shall be given forty-eight hours notice.

1.03 TESTING:

A. Prior to commencing roofing work, the Contractor shall test all circuits and units in the presence of the Owner. Testing of circuits and units includes the ground system/field.
B. All deficiencies in operation will be noted in writing and shall become a matter of record.
C. Upon completion of the reinstallation of each unit, it shall be retested by the Contractor in the presence of the Owner.
D. Any deficiencies which were not noted in the initial testing shall be corrected by the Contractor at his expense.

PART TWO - PRODUCTS

2.01 MATERIALS:

A. Any replacement parts or additional materials needed due to changes in curb or sleeper heights shall be as required by the National Electrical Code (USA).

PART THREE - EXECUTION

3.01 GENERAL:

A. Perform all work to meet the requirements of the National Electrical Code (USA) and local Municipal Electrical Codes.

3.02 DISCONNECTION:

A. Circuits shall be placed under a controlled tagging and log procedure. Prior to disconnection, all sources of power to the panel or equipment shall be verified. De-energized power circuits shall be tagged out.
B. Prior to removing equipment or panels, conductors, cables, conductors and terminals terminating in the equipment shall be uniquely identified. This information shall be recorded on a terminal connection schedule prepared for each piece of equipment. Marking shall consist of industry approved methods such as fiber cable tags and wire and terminal marking materials such as Thomas and Betts or equal. Markings shall be impervious to moisture and chemicals in the working environment.
C. Disconnected cable ends and conductors shall be protected from moisture and rain.
D. After disconnection, move electrical equipment and materials a sufficient distance to permit the installation of roofing and flashing materials.

3.03 RE-INSTALLATION:

A. Resetting: As soon as practicable after the flashing operations on a unit are completed.
B. Install any required duct or electrical connections.
C. Reinstall the units and reconnect for operation.
D. Prior to reconnection, cables and conductors shall be physically inspected to verify they are physically in serviceable condition. Cables and conductors shall be re-terminated in accordance with the termination schedules developed above. Electrical connections shall be properly torqued.
E. Prior to re-energization, electrical units shall be tested to verify continuity and proper connection. Multiphase circuits shall be verified to be connected in the correct phase sequence so that motors turn in the correct direction when energized.
F. Prior to declaring equipment "in service", the equipment and controls shall be checked for proper operation. This shall require the equipment to be exercised through three complete cycles. Any deficiencies occurring during this test shall be corrected and the equipment re-tested until it operates successfully through three complete cycles. Following this test, the equipment shall be declared operational and "in service".
G. Re-testing includes the ground system/field to ensure that the 10-ohn earth resistance is maintained and that re-connection of roof equipment did not affect this system. Refer to the US DOS AEDG Chapter 15 for guidelines.

END OF SECTION 16100